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THE MAIN BUILDING.



EXPERIMENT STATION BUILDING.

THE AGRICULTURAL COLLEGE
OF UTAH

FOURTH BIENNIAL REPORT

—OF THE—

Board of Trustees,

—TO THE—

LEGISLATIVE ASSEMBLY;

—AND—

SIXTH ANNUAL REPORT

—OF THE—

EXPERIMENT STATION.

1896.

LETTER OF TRANSMITTAL.

To His Excellency the Governor and the Legislative Assembly of Utah:

As required by law, I have the honor to transmit herewith the fourth biennial report of the Agricultural College, and the sixth annual report of the Experiment Station. I venture to call attention to what follows herein as matter of great interest and importance to the Legislature and the people of this commonwealth.

Respectfully,

W. S. McCORNICK,

President of Board of Trustees.

Report of the Board of Trustees.

The Act of the Territorial Legislature, approved March 8, 1888, establishing the Agricultural College of Utah, contains the following provision:

"SEC. 6. The Trustees shall make a report to the next General Assembly of the Legislature, succeeding the one by which it was appointed, of its important acts, including a sufficiently itemized statement of its expenditures to convey an intelligible knowledge of its disbursements; of those matters in the growth of the College of special interest to the Legislative Assembly and to the people of Utah, accompanied by an itemized estimate of the requirements of the College for the coming biennial period, with other matters that the Board may deem of interest to the Legislative Assembly."

In accordance with the foregoing provision the following report is herewith submitted.

I. THE TERRITORIAL FUNDS.

The College has two distinct sources of revenue: the Territorial fund and the Government fund. The Territorial fund supplies the plant, the land, buildings, and ordinary appliances, and must be used also for the current ordinary expenses of the institution, such as repairs, furniture, cases, shelving, tableware, cooking utensils, musical instruments, the salaries of instructors in any branches not designated in the Congressional law, and for the salaries of the treasurer, secretary, book-keeper, janitors, fireman, and for advertising, publications of any kind, circulars, reports, stamps, stationery, payment of trustees, purchase of fuel, lighting supplies, water tax, etc.

Nearly all the foregoing are items of constant expenditure, and must be met, whether the institution has a greater or smaller number of students, and does not include future improvements or unusual repairs of any kind. The expenditures for the principal items of this necessary expense for the two years ending Dec. 31st, 1895, have been as follows:

Fire Insurance on Buildings, ...	\$1123 77
Mechanic Arts Supplies—Iron material for forging, wood for carpentry exercises, etc.	84.89
Chemical Supplies—Chemicals for class work in assaying, etc.	53.18
Telephone and Telegraph	197.45
Military Supplies—Freight on ammunition for rifle and cannon practice, etc., ...	85.15
Domestic Arts Supplies—Soap, etc., for laundry, dishes, utensils, and apparatus, ...	442.51
Care of College Grounds—Irrigation, tree planting, fencing, etc., ...	337.55
Office Expense—President's and Secretary's	67.87
Desks and School Furniture	1201.03
Furniture and Furnishings of Class Rooms and Departments—Blinds, tables, chairs, shelving.	733.15
Coal and Wood.	2589.44
Water—Water tax and expense of water system.	1144 54
Trustees Expense—Mileage, per diem, and committee work	1456 30
College Secretary and Book-keeper	1822.50
Janitor—Work and supplies	1584.39
Fireman and Engineer—Including repairs on steam heating apparatus.	1091.88
Publications and Advertising	1255.43
Postage and Stationery, ...	695.21
Interest, Exchange, and Discount on Territorial Warrants	1394.87
Freight and Express.	174.16
Repairs to Building—Locks, glass, carpentry, kalsomining, plastering, etc., ...	828.95

School Supplies—Chalk, erasers, drawing material, etc.	54.00
Extra Steam Heating Apparatus.	881.50
Gymnasium Equipment	225.96
Traveling Expenses.	163.65
Commercial Department Apparatus — Letter press, bank counter, etc	72.55
Salary for teaching branches not named in Congressional law	360.00
Building Coal Cellar and Dissecting Room	694.05
Library Expense—Shelving, reading tables, etc	226.04
Dairy Current Expense	33.50
Student Labor	131.40
Military Band Expense.	13.50
Recording Deeds	8.10
Preparation of Museum Specimens	56.33
Territorial Fair Exhibit	121.76
Incidental Expenses.	455.34
Total Territorial Expense, two years.	\$21,861.90

The experience of the past two years justifies the trustees in saying that the current ordinary expenses of the College cannot be met upon a smaller average biennial expenditure than that of the last biennial period, as shown in the foregoing table. Every effort short of the absolute closing of some of the College departments has been made during the past two years to keep the current Territorial expenses within the amount appropriated at the last session of the Legislature (\$15,000), with the result given above. The trustees know of no method by which the institution can be conducted upon an expenditure of less than \$10,000 annually from the Territorial fund.

The estimate of the College expenses from the Territorial fund for the coming biennial period is as follows:

Current ordinary expense (two years)	\$20,000
Deficit	8,930
Extension of Shops	2,000
Electric Lighting Plant, and Incidentals	1,070
Total	\$32,000

The amount donated by the United States Government, (\$25,000 per year) is for the sole purpose of providing instruction in the branches named in the law and can be used only for the payment of teachers and for the purchase of a specified kind and amount of apparatus.

The continuance of this fund is conditional upon the action of the State in providing and maintaining the plant--the necessary buildings, rooms and the other ordinary facilities of an institution of higher learning; and these facilities, we repeat, cannot be provided and maintained for less than the sum we have named, which sum is less than five per cent per annum upon the present cash value of the College property. It will be observed that we ask for a small appropriation for putting electric lights into those parts of the College buildings which must be lighted in the evening. At present about seventy coal oil lamps and lanterns are in use at the College and Station; and it needs no argument from us, now that electric lights can be readily and cheaply supplied, to demonstrate the necessity for an immediate change to the electric method of illumination.

II. THE GOVERNMENT FUNDS.

The revenue derived from the Federal Government has an instructive history.

An Act of Congress, approved July 2, 1862, provided that public lands should be granted to the several states, to the amount of "thirty thousand acres for each senator and representative in Congress," for the establishment and maintenance of an agricultural college in each state. By the terms of the recent act providing for the admission of Utah as a state, the amount of public lands granted to the Agricultural College was increased to 200,000 acres.

The national law provides that from the sale of this land there shall be established a perpetual fund "the interest of which shall be inviolably appropriated by each state which may take and claim the benefit of this act, to the endow-

ment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." The act forbade the use of any portion of the aforesaid fund, or of the interest thereon, for the purchase, erection, or maintenance of any building or buildings. The enabling act prescribes the manner in which the revenues to be raised from the sale of this land shall be expended. The land will become available upon the admission of the Territory to statehood. Under an act of Congress approved August 30, 1890, the College received for its more complete endowment and maintenance "the sum of fifteen thousand dollars for the year ending June thirtieth, eighteen hundred and ninety." The act provides that this amount shall be increased by one thousand dollars each year until the annual appropriation reaches twenty-five thousand dollars. The amount received under this law for the present year will be \$21,000.

According to the law of 1890 no portion of this fund can be used for any other purpose than that of giving instruction in the branches specifically enumerated in the act itself. These subjects are the English language, and the various branches of mathematical, physical, natural, and economic science.

It is further enacted in the law that the treasurers of the respective colleges "shall be required to report to the Secretary of Agriculture and to the Secretary of the Interior on or before the first day of September of each year a detailed statement of the amount so received and of its disbursements." In the blank forms provided by the government for making this report, the following instructions are prominently given:

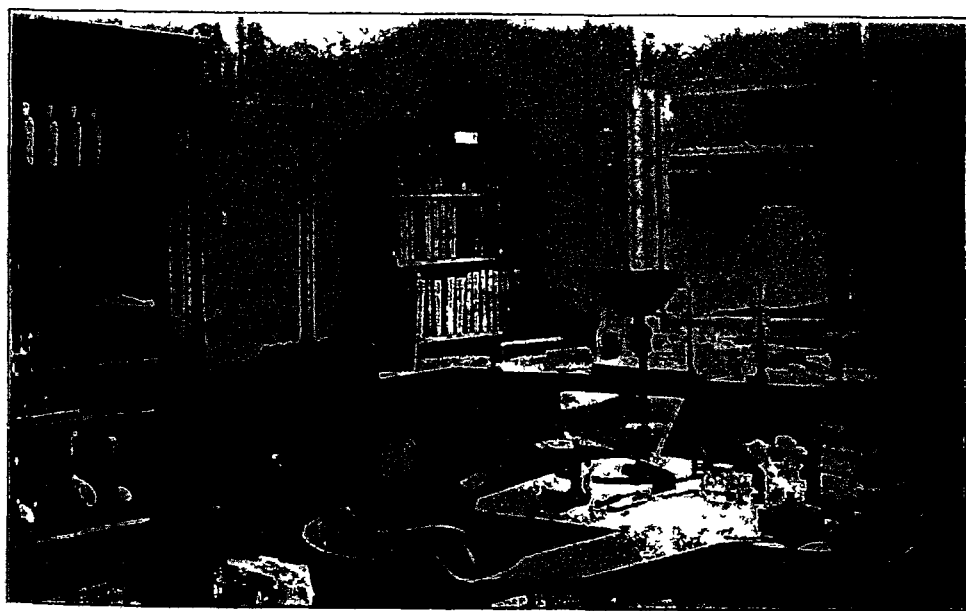
"The fact that it has already been necessary to require

several institutions to replace sums of money erroneously expended from this fund makes it advisable to call attention again to the limitations placed by the act of Congress of August 30, 1890, upon the use of the money appropriated by it, which is *to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their application in the industries of life, and to the facilities for such instruction.* It is held that this language authorizes the purchase from this money of apparatus, machinery, text-books, reference books, stock and material, used for instruction or for purposes of illustration *in connection with any of the branches enumerated,* and the payment of salaries of *instructors in said branches only.* The erection of buildings is specifically prohibited by the act, and the Assistant Attorney-General has decided that the purchase of land is not allowable. It should not be expended for repairs, furniture, cases, shelving, tableware, cooking utensils, musical instruments, the salaries of instructors in ancient and modern languages (except English) and pedagogics, or for the salaries of treasurers, secretaries, book-keepers, janitors, watchmen, etc. Neither can charges for cashing the checks of the United States Government be paid out of this fund. In short, the plant, the land, buildings, and ordinary appliances of a school must be provided from other sources, and this particular fund must be applied exclusively, to the subjects named in the act and the facilities especially required for those subjects."

This authoritative interpretation of the law by the Department at Washington makes entirely clear the purposes for which the government fund may and may not be used; and puts at rest a suggestion communicated to the last Legislature by uninformed individuals, to the effect that the trustees of the College should be required to support the institution from the general government funds alone. Had the Legislature acted upon this suggestion the College



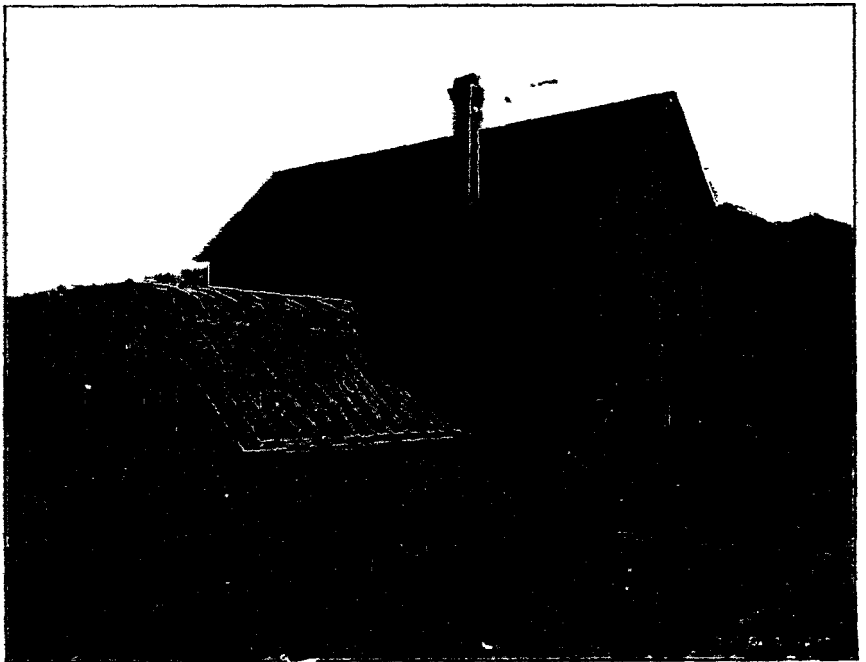
THE BIOLOGICAL LABORATORY.



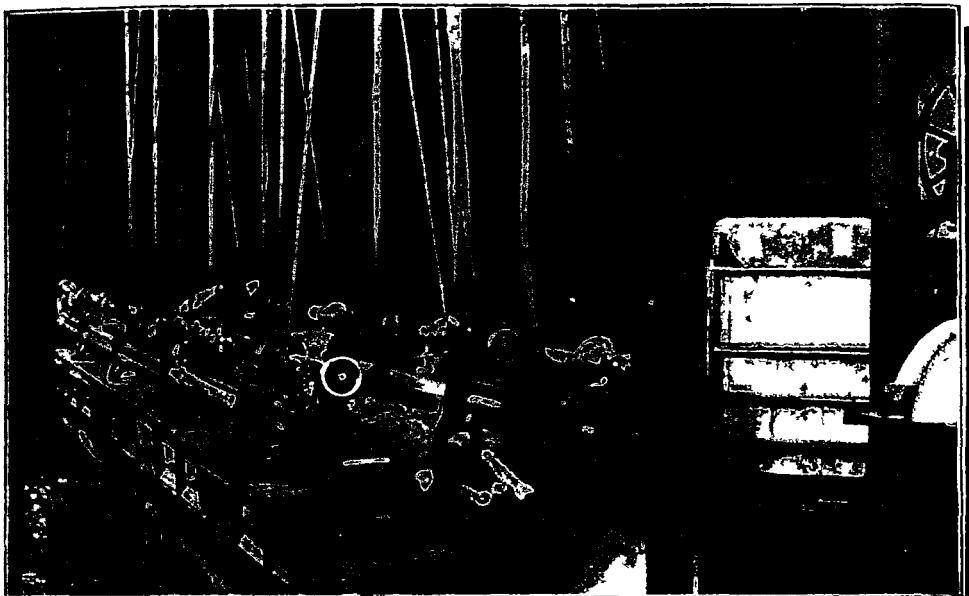
BACTERIOLOGY ROOM.



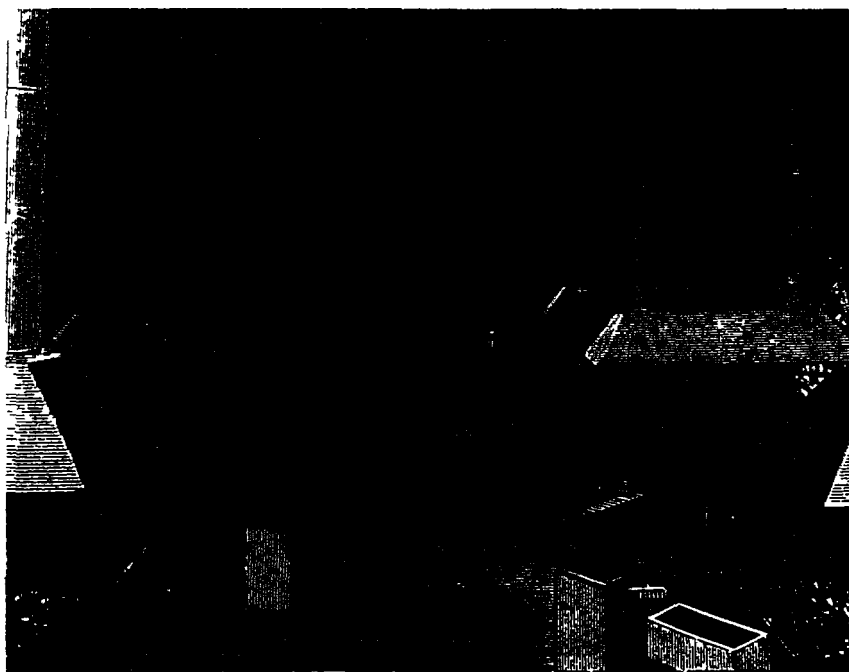
CLASS ROOM IN HUMAN AND COMPARATIVE ANATOMY.



GREEN HOUSE AND DISSECTING ROOM.



LATHES AND WOOD TURNING.



FORGE ROOM.



SEWING ROOM.



THE KITCHEN.

would have been closed, and no portion of the government fund would have been received.

FUNCTIONS OF THE COLLEGE.

A study of the national and territorial laws by which the College was established, makes clear the fact that the real purpose in view in founding these colleges was to place within the reach of the masses of the people, a technical college education in "such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life,"—an education that the older institutions had either not made provisions for, or had placed in such parts of the courses of instruction as to be beyond the reach of the class of persons whom the agricultural colleges were intended to aid. The work of the College is, to a great extent, prescribed, its policy defined, its sphere indicated in these laws. It was never intended that the College should be a mere work-shop and experimental farm combined. Although manual instruction was strongly emphasized, not manual, but intellectual instruction was the paramount object. "Secondly," to use the words of the legislative founder of these institutions, Senator Morrill, "it was a liberal education that was proposed. Classical studies were not to be excluded, and must therefore be included. The act of 1862 proposed a broad education by colleges, not limited to a superficial and dwarfed training, such as might be had at an industrial school, nor a mere manual training such as might be supplied by a foreman of a workshop or by a foreman of an experimental farm. If any would have only a school with equal scraps of labor and of instruction, or something other than a college, they would not obey the national law." The function of the land-grant colleges, says Prof. Le Roy Broun, president of the Association of Agricultural Colleges, "is not to make farmers of its students, but to make

men; men with educated brains and skilled hands, ready and willing to work with both brains and hands in whatever vocation they are best fitted to perform the duties of life."

A detailed description of the work the College is now doing is not possible within the limits of the space at our disposal. From the manuscript submitted by the President and professors, the matter which follows is abridged, a selection being given here and there, so as to indicate the quality of the work rather than to enumerate and describe the various divisions of it.

STATISTICAL.

The number of professors and teachers employed in the school in the year 1893-4 was 19. During the year 1894-5 the number was 21. During the present year, 1895-6, the number is 22.

The total enrollment of students during the year 1893-4 was 266, of an average age of 18.8 years; during 1894-5 the enrollment was 360, the average age being 19.4 years; during the first term of the present year, 1895-6, the enrollment is 400, the average age of students so far registered this year being 19.2 years.

The different College courses are shown in outline in the following pages, together with descriptive notes by the professors in immediate charge of the several departments:

- I. Four Year Course in Agriculture.
- II. Course in Mechanical Engineering.
- III. Course in Civil Engineering.
- IV. Course in Commercial Science.
- V. Course in Domestic Arts.
- VI. Two year Course in Agriculture.
- VII. Two year Course in Commercial Science.

COURSE IN MECHANIC ARTS.

It is desirable to add to the foregoing a course in the Mechanic Arts, the aim of which shall be to make bright young mechanics, not civil or mechanical engineers or scientific men. This course should begin with students in the lowest grade, that is, in the sub-freshman year of the college courses.

The proposed course would be as follows:

COURSE IN MECHANIC ARTS.

SUB-FRESHMAN YEAR

The figures denote the number of recitations or the hours of laboratory practice in each week

First Term	Second Term.	Third Term.
Grammar 5	Grammar. 5	Grammar 5
Arithmetic..... 5	Arithmetic 5	Arithmetic 5
Physical Geography.... 4	U. S. History 3	U. S. History 3
Industrial Drawing. . . 6	Industrial Drawing . . . 7	Industrial Drawing . . . 7

AFTERNOON WORK

Joinery and Turning . . 5	Cabinet Making . . . 10	Pattern Making . . . 10
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FRESHMAN YEAR.

Higher Grammar . . . 5	Rhetoric 5	Literature. 5
Plane Geometry . . . 5	Algebra. 5	Algebra 5
Elementary Physics . . 3	Elementary Physics . . 3	Elementary Astronomy. 3
Mechanical Drawing . . 7	Mechanical Drawing. . . 7	Mechanical Drawing. . 10

AFTERNOON WORK

Chipping and Filing . 10	Forge Work 10	Foundry Work . . . 10
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SOPHOMORE YEAR.

Chemistry 3	Chemistry 3	Chemistry 3
Arg. Rhetoric. 2	Arg. Rhetoric 2	Geometry of Machines . 3
Solid Geometry 3	Trigonometry. 5	Surveying 2
Higher Algebra 5	Mechanical Drawing . . 10	Mechanics. 5
Mechanical Drawing . . 10		Mechanical Drawing. . 7

AFTERNOON WORK

Machine Work 6	Machine Work. 6	Machine Work 4
Physical Measurements 4	Physical Measurements 4	Mechanics 2
		Surveying. 4

The difference between the course here suggested and those previously given is that this course receives its students a year earlier than the other courses, at a period, namely, at which they are still studying for the year the so-called common branches. This course, it will be seen, devotes one year each to woodwork, ironwork, and machine-

work—a sufficient time in which to train fairly good mechanics; the large amount of time devoted to mechanical drawing will insure competent draughtsmen; while the applied sciences and mathematics will give reality, breadth, and precision to the equipment of the student.

The course if inaugurated will require the running of the shops six hours per day, instead of three hours as at present.

This brings us to an important recommendation. The capacity of our shops is already exceeded by the applicants for admission to these branches. With the increased number which the growth of the College will bring, we shall be compelled to turn away each successive year an ever-increasing number of young men earnest for an education and desirous of becoming practical mechanics or skilled engineers. The College has been compelled, from lack of room in the shops, to exclude from shopwork a number of qualified applicants during the present year. This unfortunate limitation of a most important department will be more apparent from year to year, and the predicament of the College Faculty will be intensified each term of school, whether we add a three year course in practical mechanics, or whether we continue on our present basis. Additional shop room must be provided in any case, unless we concede that the College has already reached its limit of growth in these directions, and decide to deny to this increasing class of our young men the practical education they are seeking. Notwithstanding our conviction that of all the uses to which a State might with profit to itself put any of its revenues, that of devoting them to the actual and practical training of its young men in the mechanic and industrial arts of daily life is perhaps the most important, yet if to provide the additional room of which we speak would entail heavy expense upon the new State, we should even now hesitate to make the recommendation which follows.

But the expense will be small. We could not continue to maintain all the shops in the large building, if all were running at one time, as they must be in the future, because the

jar of the heavy machinery would, and may even at the present pressure, permanently injure our great building. Moreover, there is not sufficient room available in the large building for the shops and all the other departments, with even our present number of students.

We therefore recommend either the fitting up of additional shop-rooms in the present buildings, with such changes as would be necessary to lessen the jar of the machinery, or the removal of the forge room from the basement of the large building to a single one-story room to be erected near the College building.

The cost of building a suitable room for this purpose and of making such extensions in the Mechanic Arts department as this change would imply, will be \$2,000; and this is the amount which we ask the State to add to the appropriation for maintenance in order to guarantee to our industrial students the advantage of a thorough training in the leading branches of mechanism.

COURSES OF STUDY.

I — THE FIRST TWO YEARS.

With the exception of the afternoon industrial exercises the first two years of all the four year courses (see next page) are the same.

The studies and training of these years have been laid out with care, and students are not permitted to vary from the course shown in the outline, except as herein provided. Engineering and agricultural students must elect shop-work; commercial students, typewriting; domestic arts' students, sewing; and other students history, in the Freshman year.

In the Sophomore year, lady students take lectures on cooking in the place of trigonometry, and in the third term, the science of nutrition, instead of surveying and elementary mechanics. They also take, throughout the year in the afternoon, laboratory practice in cooking instead of physical measurements.

In the several short courses, the studies of the first two years are varied far enough to meet the requirements of this class of students.

The studies of the first two years are planned to meet the requirements of our most numerous class of students, the majority of whom attend for two years or less after completing the studies of the district schools. These two years, as now represented in the schedule, provide as broad a culture in a general way, and as thorough a preparation for the special courses which follow, as the College is at present able to offer. Whatever college course, profession, or occupation the student may afterwards undertake, the first two years as planned represent the best preliminary training the College affords. The Faculty cannot assume, therefore, to vary the courses further than is indicated above; and students must pursue the studies, or as many of them as they are able to pursue, as here laid down.

The figures denote the number of recitations or the hours of laboratory practice per week.

FRESHMAN YEAR.

First Term,	Second Term,	Third Term
Higher English Grammar—Whitney's essentials . . . 5	Rhetoric.—Invention, figures of speech and forms of composition 5	Literature.—Study of masterpieces . . . 5
Plane Geometry.—Five books, Wentworth . . . 5	Algebra.—Elementary, Wentworth 5	Algebra.—To quadratics, Wentworth . . . 5
Physics.—First principles with experiments. 3	Elementary Physics—Experiments and recitations 3	Astronomy.—Descriptive and elementary . . . 3
In addition to the above the student must elect one of the four following groups:		
History.—Eastern nations and Greece, . . . 3 and Industrial Drawing . . . 2	History.—Rome . . . 3 and Industrial Drawing . . . 3	History.—European history of the middle ages 3 and Industrial Drawing . . . 3

AFTERNOON WORK

Shopwork.—Joinery and wood-turning 2 and	Shopwork.—Forgework in iron and steel, .10 and	Shopwork.—Cabinet making and wood-carving 6 and
Drawing 2	Drawing 2	Drawing 2
Laundrying 5	Sewing 5	Dressmaking 5
Drawing 3	Drawing 3	Drawing 3
Penmanship 5	Penmanship 5	Penmanship 5
Typewriting 5	Typewriting 5	Typewriting 5

SOPHOMORE YEAR

Chemistry.—Non-metals: lectures illustrated by experiments 3	Chemistry.—The metals 3	Chemistry.—Metals—Chemical Philosophy. 3
Argumentative Rhetoric.—Principles, kinds, and arrangement of argument. 2	Rhetoric.—Written arguments and debates . 2	Botany.—Analysis of flowers and collection of herbarium 5
Solid Geometry.—Wentworth's solid & spherical 3	Trigonometry.—Wentworth's 5	Surveying.—Measurement of areas, chain surveys, and ordinary surveying 2
Higher Algebra.—Quadratics and series . . . 5	Political Economy.—Lectures and textbook recitations from Lavelle's Political Economy 3	Mechanics.—Force and energy and the laws of gases, liquids, and simple machines 5
History.—Growth of constitutional liberty 2	Civil Government.—Origin and present forms of city, township, county, and state governments 2	Civil Government.—The national constitution 2

LABORATORY WORK—AFTERNOON.

Chemical Experiments. . 6	Qualitative Chemical Analysis 6	Qualitative Chemical Analysis 6
Physical Measurements.—Heat, sound and light 4	Physical Measurements.—Electricity and Magnetism 4	Surveying.—Field work. 4

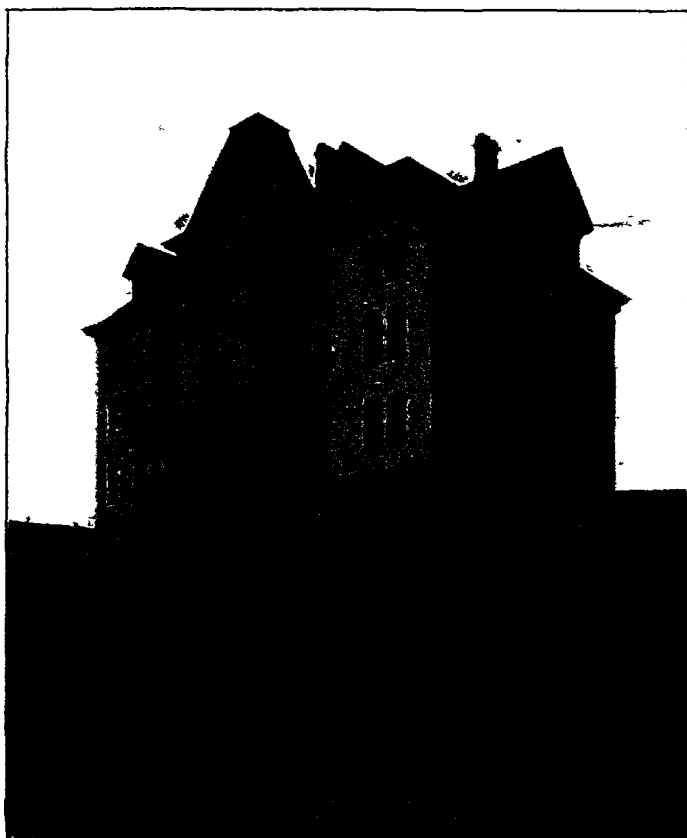
COURSE IN AGRICULTURE.

Success in farming does not depend on high or low prices, but on the ability of the farmer to utilize his land in the best possible way. He must raise crops suited to his soil and to his accessible markets, and above all he must raise maximum crops year after year. Prices are no more regulated for the business man than they are for the farmer. In each case they depend on supply and demand, and above all on the quality of the product. This illustrates the value to the farmer of a thorough knowledge of the soil. The best methods of cultivation for various farm crops are pointed out to the student, and one term is devoted to the study of the most successful methods of feeding our forage crops to livestock, so as to produce the largest possible gain from a given quantity of food.

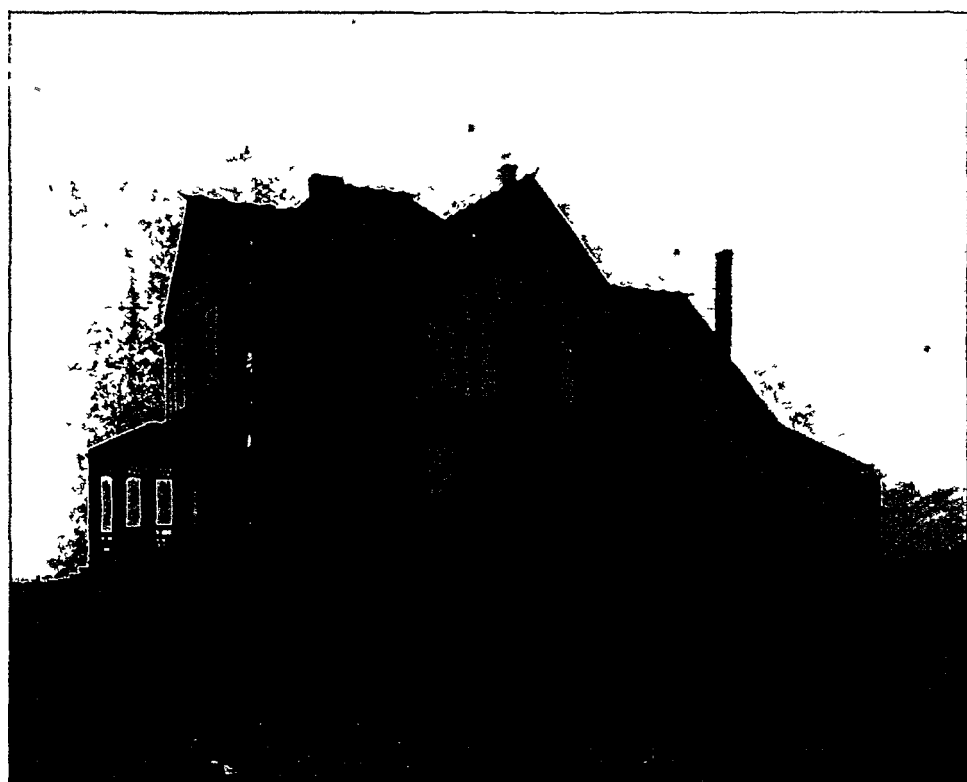
The work of the Agricultural Colleges has already had important results in changing the direction and aims of science teaching. To take one example, for illustration, botany has ceased to be regarded as a science cultivated simply for pastime. The intelligent farmer of today must be acquainted with the plants that surround him.

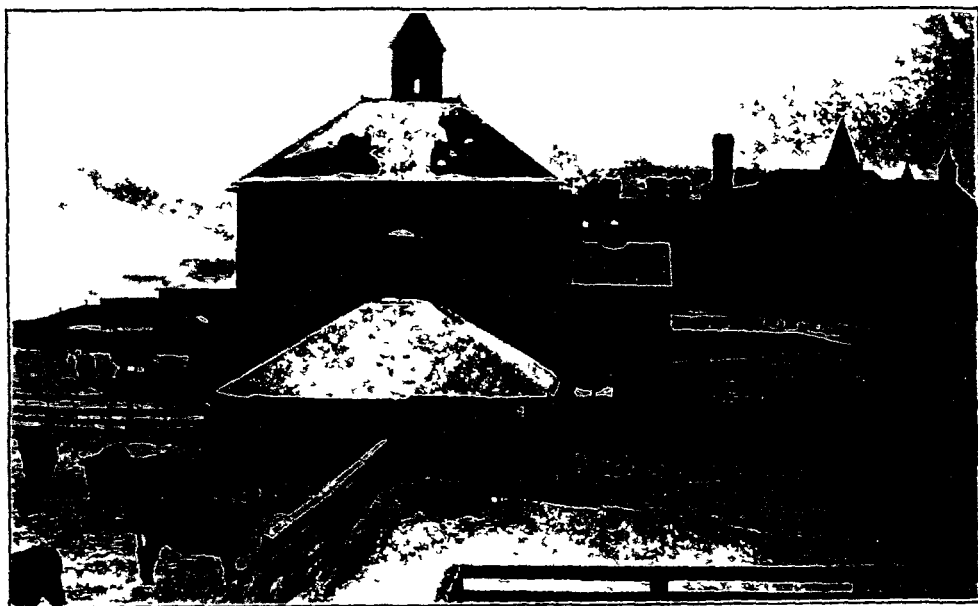
The Russian thistle, the tumble weed of the Russian steppes, has monopolized vast areas of our country. A proper knowledge of botany among the leading farmers could have prevented this. For like reasons the study of entomology, treating of injurious insects and their habits, is made a special feature of the course. To be able to fight these insect enemies most effectually, we must know their weakest points, and for this a knowledge of their habits is indispensable. Of all studies in natural science, that of entomology is one of the fascinating and attractive.

A good deal of veterinary science is included in this course, nevertheless, the aim is not to make veterinary surgeons. To be a thoroughly educated veterinarian requires equal or greater efforts than to become an efficient physician. Our aim here is to give the student of agriculture



GENTLEMEN'S DORMITORY.

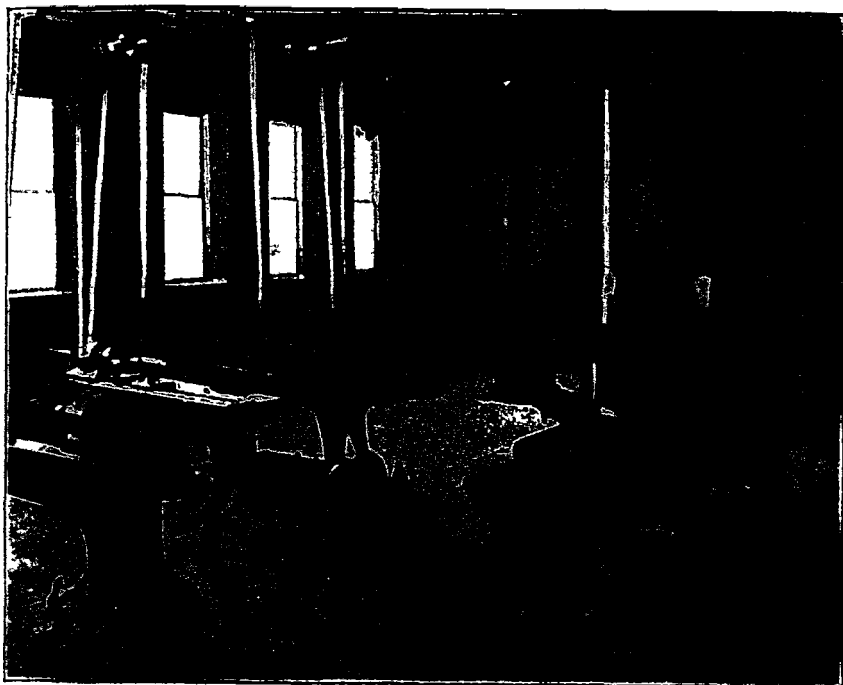




STOCK YARD.



FARM BARN.



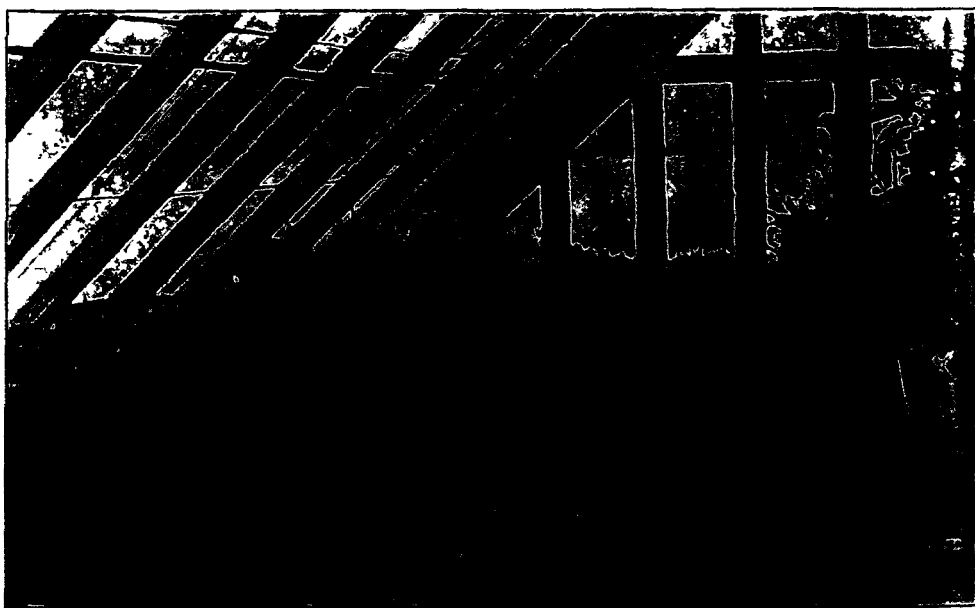
MACHINE SHOP



WOOD SHOP.



MECHANICAL DRAWING ROOM.



INTERIOR OF GREEN HOUSE.

such a knowledge of elementary medicine as will enable him, by proper care from the beginning, to keep the livestock on his farm in a healthy condition.

The teaching of the sciences is left entirely to the different science departments, while in this department they are reviewed just far enough to point out their bearing on the subject in hand. The scientific laws applicable to agriculture, are discussed under the different subjects and compared with those established by empirical methods. Should there be a difference in the conclusions from the two methods the probable causes for the difference are discussed, and their application to general and local conditions of agriculture is pointed out. The methods and systems of agriculture are discussed, but especially the methods followed by the men who have succeeded in their calling, with a view to showing how the methods of our best agriculturists may be improved. As an illustration, our best practical farmers summer-fallow land, although both chemistry and the empirical results obtained from cropping indicate that there are much better methods than summer-fallowing. The student is referred to articles by recent writers, contained in our library, in the form of larger and more exhaustive works and experiment station bulletins. Our most valuable works on agricultural topics are written in the German language, and for this reason a two years' course in that language is provided, in order that the student shall be able to familiarize himself with the agricultural progress given to the world in that language.

One lecture room is devoted to the use of agricultural instruction. Aside from this the Experiment Station has placed in the museum samples of different varieties of crops grown on the farm, and these, with other collections, give recourse to a fairly good general museum. A large and fully equipped barn filled with sheep, cattle, and hogs for experimental feeding, and a large experimental farm, afford means of illustration in the questions of the successful feeding of farm animals and the growth of crops. The students have access to a library containing the leading works on

agriculture and about one hundred of the leading agricultural papers of this and other countries. The Experiment Station keeps on file all the reports and bulletins from the different departments at Washington and from the leading experiment stations of the world; and these, under certain restrictions, are available to the students.

The department needs a room fitted up partly as an agricultural museum, but in the main as a working laboratory. This room should contain the modern appliances for illustrating the different subjects in agriculture and for making experiments to verify the principles taught. It should also contain some of the machinery and appliances used in practical agriculture.

In botany we should provide facilities for the collection of a herbarium of our State. No state in the Union affords more excellent opportunities for the accomplishment of new and important work in this line than our own. Utah has a rich and beautiful flora, of which only too little is known and appreciated.

Dairying is taught by lectures and practical work in the Station dairy. Text books are recommended but not insisted upon, because there are none that cover the subject thoroughly, and because of the expense, suitable books costing \$4 to \$5 for a term's work. Most of the time is devoted to practical butter and cheese-making in a model creamery.

Dairying may be called a practical agricultural topic, yet to be properly understood, it requires preparatory work on the part of the student, in chemistry, physics, and bacteriology.

Animal husbandry deals with the history, description, breeding and management of the different breeds of live-stock. This is strictly a practical agricultural topic, and is treated by lectures in the class room and the practical handling of the live-stock on the Station farm.

The other studies of the course are shown in the following schedule.

COURSE IN AGRICULTURE.

FRESHMAN YEAR (See page 15)

SOPHOMORE YEAR (See page 15)

JUNIOR YEAR

First Term	Second Term.	Third Term.
AG CHEMISTRY . . . 3 Composition of soils, plants, and fodders	AG CHEMISTRY . . . 3	AG CHEMISTRY . . . 3
HORTICULTURE . . . 2 Cultivation of soil, planting, picking, and marketing fruits.	HORTICULTURE . . . 2 Vegetable growing.	HORTICULTURE . . . 2 Forestry and land- scape gardening
AGRICULTURE . . . 3 History of agriculture, fences, buildings, and farm machinery.	AGRICULTURE . . . 3 History and descrip- tion of breeds of do- mestic animals	AGRICULTURE . . . 3 Soils, crops, and ferti- lizers
LITERATURE . . . 3 Historic survey of lit- erature from Chaucer to present time. His- torical sketches, illu- strations, and readings.	ANATOMY . . . 5 Lectures and recita- tions	PHYSIOLOGY . . . 5 Lectures and recita- tions
GERMAN . . . 3 Oral and written drill on etymology and syn- tax.	GERMAN . . . 3	GERMAN . . . 3
BIOLOGY . . . 2 Work on tissues and organs. Microscopic mounting, etc	ZOOLOGY . . . 2 Distribution and habits of mammals, birds, and lower forms	ETHICS . . . 2 Basic principles of the science of duty

LABORATORY WORK—AFTERNOONS.

AGRICULTURE . . . 4 Rusts, smuts, and other economic topics	AGRICULTURE . . . 2 Stockjudging or ex- terior	AGRICULTURE . . . 2 Field observations in charge of professor
BACTERIOLOGY . . . 6 Preparation of culture media Cultivation, examination, staining and mounting bacteria	BLOWPIPE ANALYSIS AND LITHOLOGY 6	HUMAN ANATOMY . . 6 Dissecting, Osteology, and Histology.
	ANATOMY . . . 2 Dissecting small ani- mals.	

SENIOR YEAR.

DAIRYING . . . 3 Lectures on cheese and butter making.	AGRICULTURE . . . 3 Draining and irrigat- ing farmlands.	AGRICULTURE . . . 3 Stock feeding and food- stuffs
STOCKBREEDING . . . 2 Lectures and refer- ences	ENTOMOLOGY . . . 2 Structure and classifi- cation of insects	ENTOMOLOGY . . . 2 Study of injurious in- sects and methods for checking their rav- ages.
PSYCHOLOGY . . . 3 Introduction to Philo- sophy.	SOCIOLOGY . . . 2 Elements of jurispru- dence	GEOLOGY . . . 5 Structure, origin, and composition of rocks and the earth's crust
GERMAN . . . 3 Reading select texts, and conversation.	GERMAN . . . 3 Reading select texts, and compositions.	GERMAN . . . 3 Select texts and scien- tific reading.
VETERINARY SCIENCE 5 Anatomy of the horse.	VETERINARY SCIENCE 5 Materia medica and general pathology and therapeutics.	VETERINARY SCIENCE 5 Special pathology and therapeutics and sur- gery.
CHEESEMAKING—MON Work in the creamery.		

AFTERNOON WORK.

BUTTERMILK AND
MILK TESTING.....2
Work in the creamery.
PHYSIOLOGICAL BOTANY 4
Lectures in plant phys-
iology and microscopic
work in plant histology.

HORTICULTURE.....2
Budding, grafting, and
greenhouse—care of
plants.
VETERINARY ANATOMY. 4

AGRICULTURE . . . 2
Stockjudging or ex-
terior.
ENTOMOLOGY . . . 4
Field work—collect-
ing, etc. or
BOTANY. 4
Field work—collecting
etc.

SHORT COURSE IN AGRICULTURE.

FIRST YEAR.

Ag. Chemistry. . . . 3
Horticulture 2
Agriculture 3
English Grammar. . . 5
Physics 3

Ag. Chemistry 3
Horticulture 2
Agriculture 3
Rhetoric 5
Physics. 3

Ag. Chemistry..... 3
Horticulture 2
Agriculture... . . . 3
Literature..... 5
Astronomy.. . . . 3

AFTERNOON WORK.

Shopwork 4

Agriculture 2

Shopwork.... . . . 4

SECOND YEAR.

Dairying 3
Stockbreeding. . . . 2
Botany. 2
Veterinary Science . . 5
Cheesemaking—Mondays

Agriculture. 3
Entomology.. . . . 2
Veterinary Science . . 5
Physical Geography. . 5

Agriculture..... 3
Entomology. 2
Veterinary Science . . 5
Geology 5

AFTERNOON WORK.

Butter Making and
Milk Testing. . . . 2
Agriculture..... 4

Agriculture 2
.....

Agriculture 2
.....

CIVIL ENGINEERING.

In this course the instruction already covers nearly all the subjects that properly belong to a civil engineer's education. Greater prominence has been given to municipal engineering on account of the rapid growth of cities, the enormous sums of money expended by municipal corporations, and the urgent need of trained specialists to design and execute the necessary works.

Great stress is laid upon that branch of engineering which relates to the storage, conveyance, and use of water. Already our farms, chiefly through irrigation, yield a revenue, exclusive of stock raising and the dairy, of over \$6,000,000 per annum. When so much can be done by the badly constructed irrigation works of the pioneers, it may reasonably

be expected that much greater returns can be obtained by a more scientific management of the water supply. By increased storage and diminished waste, by more accurate measuring apparatus and more economical methods of application, it may be possible ere long to double the value of the profits from irrigation-farming.

An education that is technical as well as practical, is always expensive to the state. At the expense of a few dollars the classical instructor can thoroughly drill students in Latin and Greek, but in teaching the science of hydraulics, the principles of surveying, the applications of electricity, or the theory of structures, there are required not only equal intellectual attainments on the part of the instructor, but an expensive equipment of precise instruments. We especially need the completion of two rooms in the basement for experimental work, more surveying instruments to accommodate the 28 students that are now registered in engineering, a testing machine, a water motor, a small dynamo, and an electric motor.

CIVIL ENGINEERING.

FRESHMAN YEAR. (See page 15)
SOPHOMORE YEAR (See page 15)

JUNIOR YEAR

First Term	Second Term.	Third Term.
Surveying — Johnson's Land Surveying .. 3	Hydraulics.—Merriman's Hydraulics . . . 5	Materials of Engineering —Wood, stone, metals, cement, brick etc.5
Mechanical Drawing — Maps, profiles, topography	Calculus. — Differentiation with applications 5	Calculus.—Integration infinitesimals and variables. 5
Literature.— Historical sketches, illustrative readings, Chaucer, Tennyson 3	German — Etymology and syntax. 3	Mechanism.— Elements of machinery 4
German.—Oral and written drill on etymology and syntax . . . 3	Analytical Geometry — Plane curves, equations of second degree.5	German. — Etymology, and syntax 3
Descriptive Geometry.— Projections and intersections, curved surfaces, surfaces of revolution 2		Analytical Geometry.— Planes and surfaces of revolution 5

AFTERNOON.

Field Practice in Engineering . . . 8	Drawing and Designing 8	Mechanical Drawing ., 2
		Hydrographic Surveying 6

SENIOR YEAR.

Higher Surveying.— Johnson's Higher Surveying, Merriman's Geodesy 5	Municipal Engineering.— —See first term 3	Roads and Pavements— Bryne's Highway Construction 5
Municipal Engineering.— —Water-works, sewerage, gas and electric lighting 2	Irrigation Engineering 2	Applied Electricity— Lecture notes and experimental work 5
Irrigation Engineering.— —Flynn's text and lectures 3	German.—Select texts— Composition 3	German.—Select texts— Scientific 3
German.—Reading select texts— Conversation 3	Power, Measurement.— Prony brake, dynamometers, losses in transmission 5	
Applied Mechanics— Statics, dynamics, roof and bridge trusses 5	Applied Mechanics.— —Determination of stresses. 5	
Experimental Work.— Engineering designs 8	Mineralogy and Assaying 6	Thesis Work

AFTERNOON.

MECHANICAL ENGINEERING.

The course in mechanical engineering will serve to illustrate the demands which technical education makes upon the resources of a college of science. The theoretical part of the work is based almost entirely upon the principles of mathematics and physics; and it is not possible to prosecute with success the more technical subjects which come later, unless the student has received thorough training in these departments. The practical work is the application to special cases of theoretical principles, by means of data based upon direct experiment. It would be hazardous to graduate students of engineering with the recommendation of the College to the engineering profession, who have not had practical training in the most essential part of their work; that, namely, of gaining experimental data. In these professions, to know how to do, comes only by doing. This implies not only special models and machines for illustration and experimental purposes, but also a general well equipped machine shop, intelligently operated by skilled practical mechanics under the direction of the engineering

department, in which the student becomes familiar with, and to a certain degree skillful in, the manipulation of tools. Only by performing with his own hands the actual processes of construction can the student learn the characteristic quality of good work—accuracy.

The fact that seventeen students are registered in this department at present, indicates the extent of the demand for this work and demonstrates the necessity for increased facilities both in the teaching force and in suitable apparatus for laboratory work. Several machines, and additional tools and benches are now indispensable to the work of this department.

The outline of study in this course appears on the following page.

MECHANICAL ENGINEERING.

JUNIOR YEAR.

First Term.

German ..	3
Oral and written drill on etymology & syntax.	
English Literature	3
Historical sketches & illustrative reading, Chaucer and Spenser.	
Analytic Geometry.....	5
Plane curves, equations of second degree, planes and surfaces of revolution.	
Descriptive Geometry. 2	
General projections & intersections, curved surfaces, surfaces of revolution.	
Mechanical Drawing	.5

Second Term.

German	3
Etymology and syntax.	
Hydraulics	5
Merriman's Hydraulics.	
Differential Calculus ..	5
Differentiations with applications, simple integrations.	
Descriptive Geometry ..	2
Continued—as in term 2nd.	
Mechanical Drawing...	5

Third Term.

German	3
Etymology and syntax	
Mechanism	4
Elements of machinery	
Integral Calculus.	5
Integrations, infinitesimals, and variables.	
Metallurgy of Iron and Steel	3
Mechanical Drawing...	5

AFTERNOON WORK.

Pattern Making 10

Machine Work in Iron 10

Machine Work in Iron 10

SENIOR YEAR.

Steam Engineering ..	5
Valve gears, thermodynamics.	
Applied Mechanics	5
Statics, dynamics, roof and bridge trusses.	
Municipal Engineering 3	
Water-works, sewerage, gas and electric lighting, rapid transit.	
German	3
Reading select texts, conversation.	

Steam Engineering.....	
Thermodynamics of steam engine, engine testing.	
Applied Mechanics	5
Determination of strains and stresses	
Municipal Engineering 3	
Continuation of first term.	
Power, Measurement and Transmission ...	3
Prony brake, Dynamometers, losses in transmission.	
Machine Design.....	2
Proportioning simple parts of machines.	
German	3
Select texts, composition.	

Steam Engineering..	5
Boilers, construction and care of	
Applied Mechanics	3
Strength of materials, friction, general theory of elasticity.	
Applied Electricity. .	5
Lecture notes and experimental work.	
Machine Design.....	2
General proportionment and arrangement of parts of machines.	
German	3
Select texts, scientific	

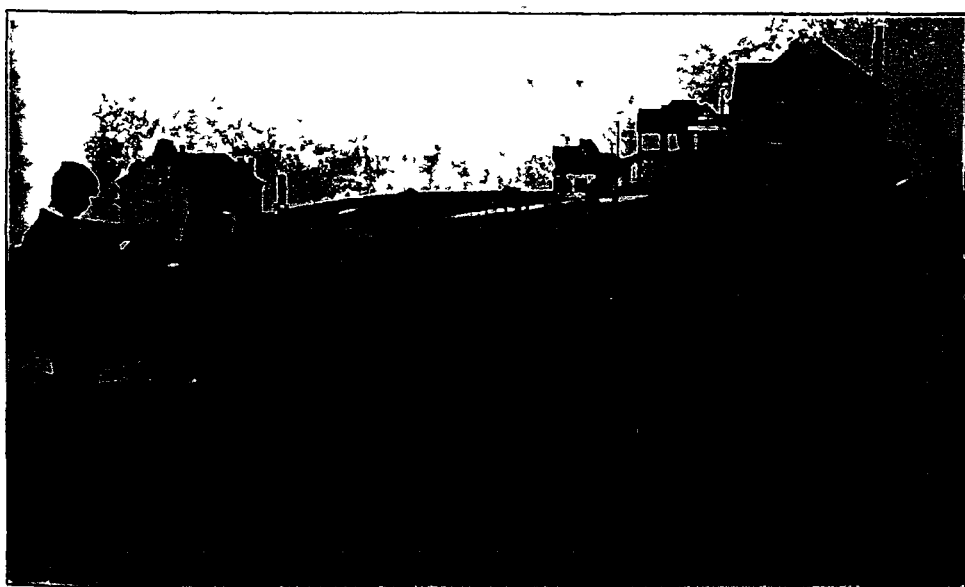
AFTERNOON WORK.

Drawing and Experimental Work
 Practical Engineering.

10



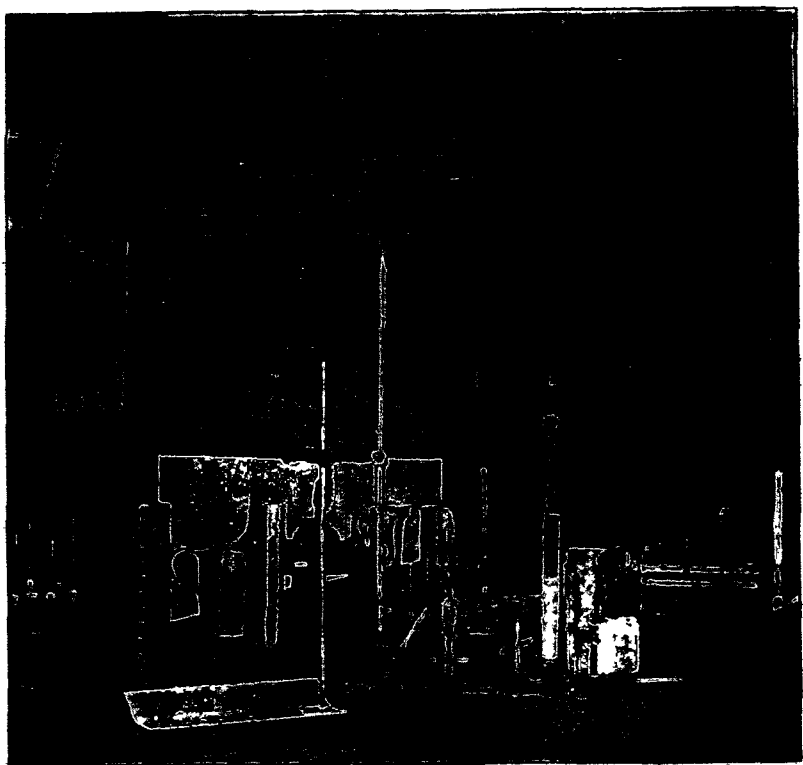
PRESIDENT'S OFFICE



FIELD WORK IN SURVEYING.



THE DAIRY.



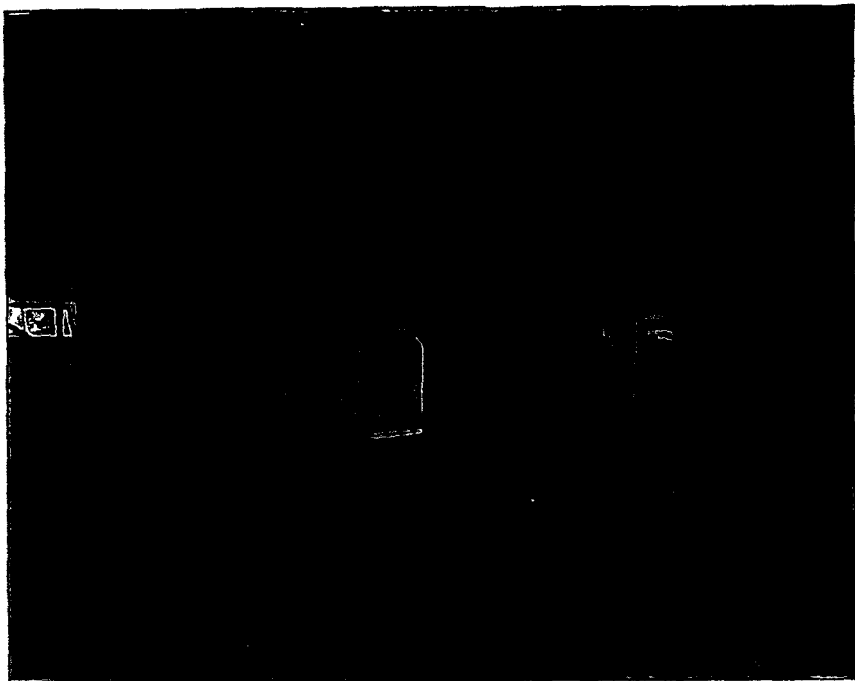
MILK TESTING.



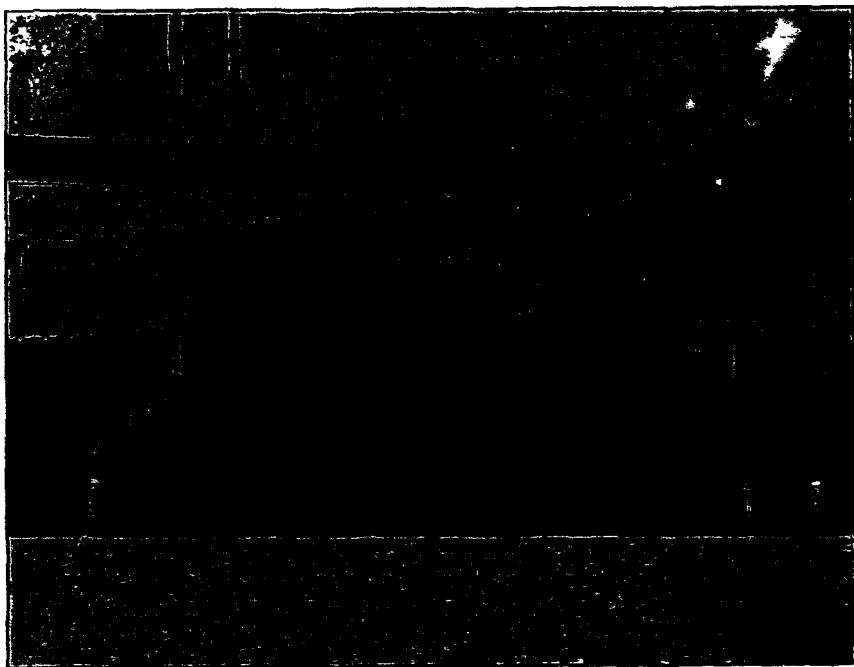
COMMERCIAL ROOM.



TYPEWRITING AND STENOGRAPHY.



THE GYMNASIUM.



THE CHAPEL.

COMMERCIAL COURSE.

From all the special studies taught in commercial science, only one will be mentioned by way of illustration.

Book-keeping is taught according to a system of business practice, no text book being used. Bank counters, desks, copying presses, and all of the business forms, such as notes, drafts, bill heads, deeds, leases, etc., the like of which are found in business houses, are in daily use. All kinds of transactions are made by the students and are properly recorded in their books. Each student is proceeding independently of every other one. The cost and selling prices in buying and selling are governed by real market quotations, making a loss and gain to the student, and causing his present worth to be continually changing. It is our aim to cover the entire field of book-keeping as practically and thoroughly as is possible in a college.

Owing to an increase in the enrollment of students in this department, this year, we shall be unable to accommodate them all in this work next year, unless there can be provided a few more desks, counters, and other equipments which are indispensable to the practical presentation of the work.

The full course is exhibited in outline in the schedule which follows:

COMMERCIAL COURSE.

FRESHMAN YEAR, (See page 15)
SOPHOMORE YEAR (See page 15)

JUNIOR YEAR

Stenography 5	Stenography 5	Stenography 5
Graham's system of standard phonography	German 3	German 3
German..... . . . 3	Anatomy & Physiology.5	Anatomy & Physiology.5
History of Commerce .5	Lectures and labora- tory work in human and general anatomy.	Lectures and demon- strations, and sanitary science
Recitations and lec- tures on general history of commerce, and recent and existing commerce.	Logic 3	Ethics 2
Psychology 3	Text book lessons on syllogisms and falla- cies.	Basic principles of the science of duty
Introduction to philos- ophy.	Sociology 2	Science of Bookkeeping 5
Sociology 2	Elements of jurispru- dence.	The underlying princi- ples of single and double entry.
Village communities and early history of in- stitutions.		

AFTERNOON EXERCISES.

Penmanship 5	Mineralogy 6	Anatomy 6
Typewriting 5	Anatomy 2	
(Optional.)		

SENIOR YEAR.

Commercial Law 5	Commercial Law 5	Commercial Law 5
Formation, operation, interpretation, and discharge of contract.	Agency, partnership, corporation, commercial paper.	Sales, real property, insurance, the statutes, etc.
German 3	German 3	German 3
Com. Mathematics 5	Com. Mathematics 3	Business Economics 2
Drill for ready comprehension and solution of practical commercial problems.	Equating accounts, partnership settlements, corporation problems, etc.	General principles of political economy technically applied to commerce and discussion of business methods.
Literature 3	Advanced Political Economy 2	Literature 5
Historical sketches, illustrative readings. Chaucer—Tennyson.	Economic problems of the day.	Geology 5
	Elective 5	

AFTERNOON EXERCISES.

Practical work in book-keeping, banking, freighting, insurance, daily from two to four. Regular dates, business forms, etc., in constant use.

SHORT COMMERCIAL COURSE.

FIRST YEAR:

First Term.	Second Term.	Third Term.
English Grammar 5	Rhetoric 5	Literature 5
Plane Geometry 5	Algebra 5	Algebra 5
Military drill.	Military drill.	Military drill.
Elementary Physics 3	Elementary Physics 3	Science of Bookkeeping 5
History of Commerce 5	Civil Government 2	Constitutional Law 2

AFTERNOON EXERCISES.

Penmanship 5	Penmanship 5	Penmanship 5
Typewriting 5	Typewriting 5	Typewriting 5

SECOND YEAR.

Commercial Law 5	Commercial Law 5	Commercial Law 5
Rhetoric 2	Rhetoric 2	Literature 5
Stenography 5	Stenography 5	Stenography 5
Com. Mathematics 5	Com. Mathematics 3	
	Political Economy 3	

AFTERNOON EXERCISES.

Practical work in book-keeping, banking, freighting, insurance, etc.

SUBJECTS AND STUDENTS.

The classes taught during the first term of the present year with the number in each will be seen from the following table:

SUB-FRESHMAN YEAR.

Physical Geography ..	98
Grammar	137
Arithmetic.....	182
Elocution	170
Industrial Drawing..	120
Penmanship.....	203
Wood Work.....	38
.....	

FRESHMAN YEAR.

Industrial Drawing ..	40
Wood Work	38
Plane Geometry..	89
Grammar ..	96
Laundry Work.	14
Sewing	98
Elementary Physics	98
General History.....	91

SOPHOMORE YEAR.

Horticulture.....	2
Argumentative Rhetoric	26
Solid Geometry ..	12
Higher Algebra ..	16
Agriculture ..	5
Chemistry	26
Sanitary Science	19
Physical Measurements	15
Anatomy and Physiology	11
Advanced Botany..	15
Modern History.....	34
.....	

JUNIOR YEAR.

Agricultural Chemistry	2
Organic Chemistry ..	1
German ..	10
English Literature.	10
Bacteriology.....	6
Biology ..	8
Metal Work ..	5
Fruit Work	4
Analytical Geometry	3
Descriptive Geometry	1
Surveying	2
Psychology ..	10

SENIOR YEAR.

Higher Surveying.....	2
Irrigation Engineering....	3
Municipal Engineering	3
Engineering Designs ..	1
Veterinary Science.	5
Advanced Bacteriology	3
Dairying ..	4
Animal Husbandry ..	5
Sociology ..	5
.....	
.....	

COMMERCIAL WORK.

Commercial Mathematics.	13
Advanced Book-keeping	10
History of Commerce ...	3
Typewriting... ..	21
Stenography.	3

PREPARATORY COURSE.

Geography ..	110
Grammar ..	114
Arithmetic ..	109
Classics ..	34

DOMESTIC ARTS.

The course for young women is in general the same as for young men in the four years' course in Agriculture, except in the hours devoted to shop, farm, and horticultural work. In the place of these are special studies adapted to woman's work.

Some of the more unusual studies of the ladies' course—unusual, that is, in colleges—are here described for the information of inquirers.

LAUNDRYING.

Laundrying occupies the entire fall term, practical work alternating with lectures. The practice includes plain white washing, clear starching, best methods of doing up fine mull, of ironing shirts, cuffs, and collars, of washing flannels, together with removing spots and stains of various kinds. The laundry room is fairly well equipped with soapstone tubs, Chicago clothes dryer, ironing tables, flat irons, etc.

FRUITWORK.

In fruitwork, the first half of the term is practice in putting up in various forms the fruits raised in the valley, as well as in other parts of Utah. Much of the fruit used is raised on the College farm. The practice includes canning by various methods, steaming in bottles, and sealing with wax and cotton batton; and making all kinds of preserves and marmalades. Different methods of making jellies, experiments with green and ripe fruits; all kinds of catsups, spiced fruits, sweet and sour pickles and meat relishes; fruit juices, cordials, and syrups. Fruit is put up free of charge for ladies in town who furnish their own materials. Fruit is put up for use in lunches, and banquets are served by the cooking class to defray the cost of materials used.

The last half of the term's work is a course of lectures on chemical nature of fruit, acids, sugars, and the value of fruit as food, its action in the human system, the cause of fruit fermentation, and a study of antiseptics.

HOUSEHOLD MANAGEMENT.

This is a course of lectures on all subjects pertaining to the wellbeing of the home, from a standpoint of health, comfort, and artistic beauty; convenient arrangement of the kitchen with a view of saving labor, plan of dining room, china closets, pantry, store-room, sleeping rooms, etc.; best methods of doing all kinds of house work; treatment of servants, entertainment of guests, etc.

There is a class of Senior girls in æsthetics. This is a course of lectures on the science of taste and beauty. Harmony in house furnishing, and harmony in colors, make the study especially valuable to young ladies.

COOKING.

This includes a course of lectures, one hour daily throughout the term, on the different processes of preparing food, and cooking it, changes which take place and reasons for the same; marketing, selecting meats, and economy in purchasing food.

The practice occupies two afternoons of each week and covers all kinds of plain cooking and some fancy cooking, dainty and economical methods of serving cooked food left from a meal, etc. Each member of the class performs the work of the article which is her lesson for the day, and is responsible for its success. The class prepares and serves a three course lunch on each school day to teachers and others. The young ladies take turns in presiding as hostess, carving and serving plates and looking after the needs of the guests, while another member of the class waits upon the table. The confidence and skill thus acquired are invaluable to them. The department is self-supporting with the exception of fuel. A charge of fifteen cents is made for the lunches, which usually covers the cost of materials. The food that is not needed for lunches, is sold for cost of materials. A fee is charged each member of the class to cover waste and breakage.

The Hygiene given in the short course includes that part of household sanitation and hygiene especially beneficial to

women, as well as valuable instruction for home nursing.

The spring term brings a class of sophomore girls in the Science of Nutrition. This study is a course of lectures on foods, and the way in which they sustain the human body. Special attention is given to economy in foods, and to a study of those foods that provide the most and best nutriment at the least cost. Part of the term is given to the study of the best foods to be given in different diseases. This part of the work includes practice in the afternoon, when about forty demonstration lessons in invalid cooking are given. Hygiene is a course of lectures daily upon sanitation in the home, dangers from unclean cellars, sinks, and slops about the door, necessity for fresh air and sunlight in the house; instruction especially necessary to women on the care of personal health. The last part of term is devoted to scientific instruction in home nursing, with illustrative lessons on making beds and changing bedding for the sick without danger to the patient. This training in connection with invalid cookery makes a course of very great value for our young ladies.

The entire course is shown in outline in the following schedule:

DOMESTIC ARTS.

FRESHMAN YEAR. (See page 15.)

SOPHOMORE YEAR. (See page 15.)

In place of Shopwork, Freshman Year:

Laundrying.....5
Practice in plain, ornamental, and laundry methods with muslin, fine mull, and linen.

Sewing.....5
Varieties of hand-stitching on muslins, flannels, and woollens.

Dressmaking.....5
Machine sewing and the making of muslin and dress cloth articles.

In place of Physical Measurements
Trigonometry, Surveying & Mechanics

Fruitwork.....4
Practice in cooking, canning, and preserving fruits and vegetables.

Practice in Cooking.....4
Daily preparation of lunches, with table setting, serving and waiting.

Advanced Cooking.....4
Invalid cooking and special dishes.

Floriculture.....2
House plants and ornamental gardening.

Science of Nutrition.....4
Food values in relation to waste and repair of tissues.

JUNIOR YEAR

First Term	Second Term	Third Term.
Horticulture .. . 2	Anatomy & Physiology 5	Anatomy & Physiology 5
Psychology... 3	Zoology .. . 2	Hygiene 2
German .. . 3	German 3	German 3
Literature 3	Designing, Cutting and	Geology 5
Geometric Drawing 2	Fitting 5	

LABORATORY WORK.—AFTERNOONS.

Bacteriology 6	Anatomy 2	Anatomy 2
Microscopic examina- tion of germs, culture and mounting	Dissections	Dissections
	Mineralogy 6	Geology 2
	Crystallography, etc	Field work.

SENIOR YEAR.

Sociology 2	Æsthetics 2	Ethics 3
Village communities and early history of institutions	Theory of taste and beauty applied to har- mony in dress and house furnishings.	Basic principles of science of duty.
Household Management 5	Advanced Cooking 5	Fancy Work 5
Arrangement of rooms and methods of home- work	Fancy cooking and plans for bill of fare.	Kensington, Roman & Spanish art work, etc
German 3	German 3	German 3
Economic Botany . . . 2	Horticulture 2	Literature 3
Dairying 3	Dairying 3	Biology 2

LABORATORY WORK.—AFTERNOONS.

Economic Botany 2	Horticulture 2	Biology 4
Dairying 4	Dairying 4	

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**ENGLISH.**

Only a passing mention can be made of the various other departments of instruction. It will be seen from the schedules of courses that the study of the English language and its literature extends over more or less of four years, beginning with the sub-freshman. The library and reading room is a valuable adjunct to this and, indeed, to all other departments of study. The reading room is open every school day throughout the year to the students and the general public. It is located in the north end of the building in a large, attractive, well-lighted room. Books are taken free by the students for two weeks at a time. The general library contains about 3000 volumes of carefully selected

works. Besides these, the students have access to some of the libraries of the professors, that of the professor of English alone containing 2800 selected volumes of English authors. The list of periodicals on the tables of the reading room is as follows:

|                       |                                           |
|-----------------------|-------------------------------------------|
| Forum.                | Education.                                |
| Scribners.            | Werner's Voice Magazine.                  |
| Harper's Monthly.     | The Nation.                               |
| Edinburgh Review.     | Peterson's Magazine.                      |
| Outlook.              | Studies in Natural and Political Science. |
| Cosmopolitan.         | Century.                                  |
| University Magazine.  | North American Review.                    |
| Atlantic Monthly.     | Harper's Bazar.                           |
| Ladies' Home Journal. | Youths' Companion.                        |
| University Chronicle. | Munsey's.                                 |
| Puck.                 | Art Education.                            |
| Atlantic Monthly .    | Journal of Education.                     |
| Literary World.       | Students' Journal.                        |
| Harper's Weekly.      | The Dial.                                 |
| The Critic.           | Judge.                                    |
| McClure's Magazine.   | American Journal of Politics.             |
| Review of Reviews.    |                                           |

#### SCIENTIFIC MAGAZINES.

|                                                           |                          |
|-----------------------------------------------------------|--------------------------|
| American Machinist.                                       | Science.                 |
| Journal of Engineering Societies.                         | Popular Science Monthly. |
| Transactions of American Society of Mechanical Engineers. | Housekeeper.             |
| Good House-keeping.                                       | Sanitarian.              |
| Table Talk.                                               | Scientific American.     |
| Engineering Magazine.                                     | American Naturalist.     |
|                                                           | Machinery.               |
|                                                           | The Housekeeper.         |
|                                                           | Nature.                  |

#### AGRICULTURAL MAGAZINES.

|                       |                      |
|-----------------------|----------------------|
| Agricultural Science. | Garden and Forest.   |
| American Bee Journal. | Irrigation Age.      |
| Country Gentleman.    | Pacific Rural Press. |
| Farm Poultry.         |                      |



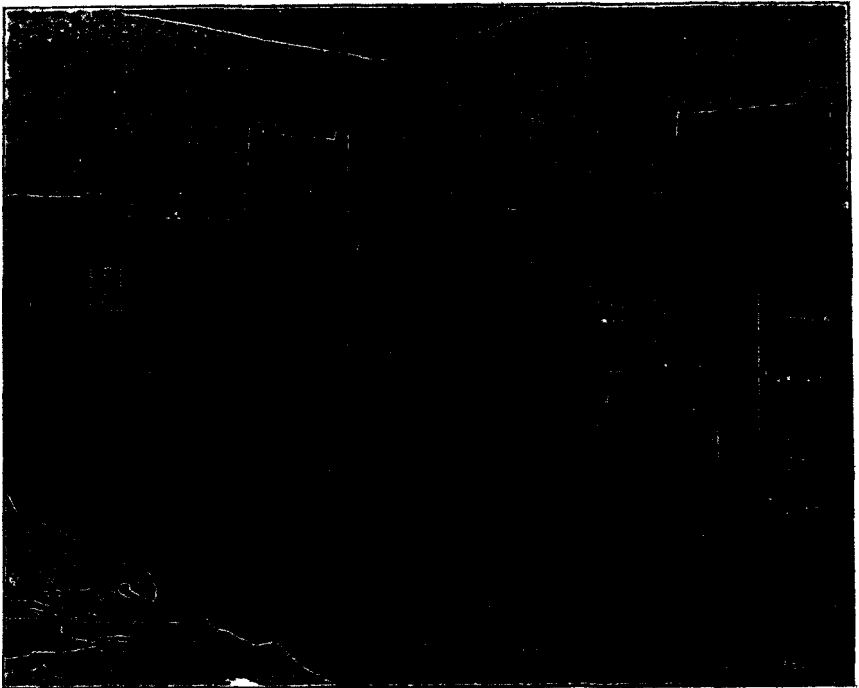
SECTION OF ENGLISH LIBRARY.



THE MUSEUM.



READING ROOM.



THE LIBRARY.



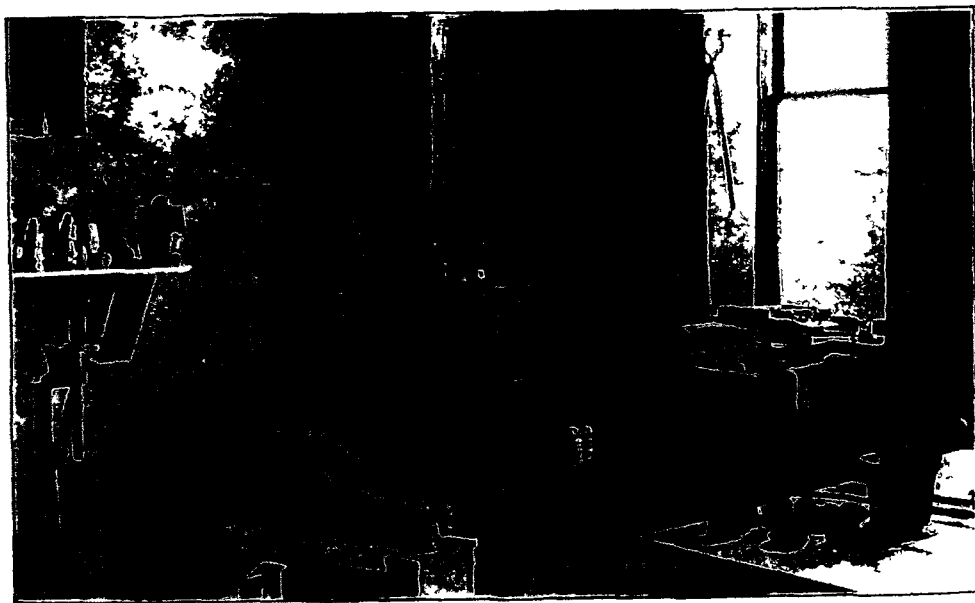
THE CHEMICAL LABORATORY.



CLASS ROOM IN CHEMISTRY.



CHEMICAL LABORATORY NO. 2.



A SSAYING ROOM.

## NEWSPAPERS AND PERIODICALS.

Following is a list of periodicals received at the Experiment Station library, through the courtesy and liberality of the publishers, in exchange for the publications of the Station. Free access to these and other publications is allowed to College students and to the general public. The list comprises nearly all the best agricultural papers of the country, and in connection with the College list of periodicals, constitutes an excellent current library of agriculture and related sciences.

|                                                       |                                                                      |
|-------------------------------------------------------|----------------------------------------------------------------------|
| Agricultural Epitomist.                               | Holstein Friesian Register.                                          |
| Agriculturist.                                        | Hospodar.                                                            |
| American Agriculturist,<br>middle & western editions. | Indiana Farmer.                                                      |
| American Creamery.                                    | Industrial American.                                                 |
| American Cultivator.                                  | Industrialist.                                                       |
| American Fertilizer.                                  | Irrigation Age.                                                      |
| American Gardening.                                   | Journal Board of Agriculture,<br>London, England.                    |
| American Grange Bulletin.                             | Journal of Agriculture.                                              |
| American Horticulturist.                              | Jersey Bulletin.                                                     |
| American Sheep Breeder<br>and Wool Grower.            | Kansas Farmer.                                                       |
| American Swineherd.                                   | Live Stock Indicator.                                                |
| Baltimore Weekly Sun.                                 | Live Stock Report                                                    |
| Bell's Weekly Messenger.                              | L'Industrie Laitiere, Paris,<br>France.                              |
| Breeders' Gazette                                     | Louisiana Planter.                                                   |
| California Cultivator and<br>Poultry Keeper.          | Milch Zeitung, Bremen,<br>Germany.                                   |
| California Fruit Grower.                              | Mirror and Farmer.                                                   |
| Chronique Affricole, Lau-<br>sanna, Switzerland.      | Nebraska Farmer.                                                     |
| Church and Farm.                                      | Neue Zeieschrift fur Ruben-<br>zucker-Industrie, Berlin,<br>Germany. |
| Clover Leaf.                                          | New England Farmer.                                                  |
| Colman's Rural World.                                 | Ohio Farmer.                                                         |
| Commercial Agriculture.                               | Orange Judd Farmer.                                                  |
| Connecticut Farmer.                                   | Practical Farmer.                                                    |
| Creamery Journal.                                     | Prairie Farmer.                                                      |
| Cultivator.                                           | Revue Internationale des<br>Falsifications, Amster-<br>dam, Holland. |
| Dairy The, London, Eng-<br>land.                      | Rural Canadian, Toronto,                                             |
| Dairy World.                                          |                                                                      |
| Dakota Farmer.                                        |                                                                      |

Elgin Dairy Report.  
 Farmer's Advocate.  
 Farm, Field, and Fireside.  
 Farm and Fireside.  
 Farmer's Guide.  
 Farm and Home.  
 Farmer's Home.  
 Farm Journal.  
 Farmers' Call.  
 Farmer's Magazine.  
 Farming, Toronto, Ont.,  
 Canada.  
 Farm News.  
 Farm and Orchard.  
 Farmers' Review.  
 Farm, Stock, and Home.  
 Field and Farm.  
 Gardening.  
 Grange Visitor.  
 Hoard's Dairyman.

Ont., Canada.  
 Rural Life.  
 Scottish Farmer, Glasgow,  
 Scotland.  
 Southern Cultivator.  
 Stockman and Farmer.  
 Successful Farmer, The.  
 Sugar Beet.  
 Texas Farm and Ranch.  
 Ulster Agriculturist, The,  
 Belfast, Ireland.  
 Wallan's Farmer.  
 Weekly Tribune.  
 Western Agriculturist and  
 Live Stock Journal.  
 Western Rural.  
 Wisconsin Agriculturist.  
 Wool, Mutton, and Pork.  
 World, thrice a week.

And the following Utah newspapers;

Advocate, Price.  
 Argus, Salt Lake City.  
 Bugler, Brigham City.  
 Democrat, Eureka.  
 Express, Vernal.  
 Independent, Sandy.  
 Inter Mountain Advocate,  
 Salt Lake City.  
 Labor World, S. L. City.  
 Mercury, Mercur.  
 Republican, Logan.  
 Press, Ogden.  
 Record, Park City.  
 Standard, Ogden.  
 Tribune, Salt Lake City.  
 Woman's Exponent.  
 Dispatch, Provo.  
 Advocate, Richfield.  
 Banner, Lehi.  
 Bulletin, Bingham.  
 Enquirer, Provo.  
 Globe, Payson.  
 Independent, Springfield.

Journal, Logan.  
 Messenger, Manti,  
 Deseret News, S. L. City.  
 Progress, Fillmore.  
 Review, Ogden.  
 Times, Coalville.  
 Utonian, Beaver.  
 Standard, Nephi.  
 American, Murray.  
 Blade, Deseret.  
 Clipper, Farmington.  
 Enterprise, Ephraim.  
 Herald, Salt Lake City.  
 Item, American Fork.  
 Men and Women, S. L. City.  
 Miner, Tintic.  
 New Star, Salt Lake City.  
 Box Elder News, Brigham.  
 Record, Cedar City.  
 Sentinel, Manti.  
 Transcript, Tooele,  
 Wasatch Wave, Heber.  
 Pyramid, Mt. Pleasant.

## MATHEMATICS.

The study of pure and applied mathematics extends in the engineering courses throughout the four years, comprising such subjects as analytical geometry, calculus, descriptive geometry, higher surveying and geodesy, measurement and transmission of power, hydraulics, applied mechanics, graphical statics, roofs and bridges, etc.

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## PHYSICAL SCIENCE.

Elementary chemistry extends through two years and includes qualitative and quantitative analysis, and organic chemistry. Elementary physics covers portions of two years, the second being a course in physical measurements in the laboratory. Advanced courses in both these subjects are offered, either of which, like the main courses already described, leads to the degree of Bachelor of Science.

In mineralogy and assaying, hundreds of actual assays of ores are made by the class. This department has grown so rapidly that it has been necessary to construct a large brick furnace for making the assays and also for exercises in the metallurgy of iron and steel.

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## BIOLOGY.

This department offers facilities quite unusual in western colleges in the practical study of microscopy. The students cultivate germs in culture media, and do much other original microscopic work upon the lower orders of animal and plant life. General biology, zoology, fungology and protophytology, anthropology, bacteriology, and sanitary science, are included in the work offered. Advanced work in these lines is provided, leading, as in physical science, to the baccalaureate degree.

# Agricultural College of Utah.

*Italics denote studies that begin Jan. 7. Roman letters denote studies that continue from the first term.*

## PROGRAMME—Second Term, First Hour.

| TIMES | SUBJECT.                              | ROOM. | RECITES             | TEACHER.        | TAKEN BY             |
|-------|---------------------------------------|-------|---------------------|-----------------|----------------------|
| 5     | Rhetoric A to K. . . . .              | 32    | Daily . . . . .     | MacEwan. . .    | All Freshmen         |
| 5     | <i>Algebra L to Z</i> . . . . .       | 33    | Daily . . . . .     | Langton. . .    | " . . . . .          |
| 3     | Chemistry . . . . .                   | 46    | Tu. Th. & Sat. . .  | Widtsoe . . .   | All Sophomores . . . |
| 2     | Agr. Chemistry . . . . .              | Sta.  | Wed. and Fri. . .   | Widtsoe . . .   | Jun. Ag. . . . .     |
| 4     | <i>Anatomy &amp; Physiology</i> . . . | 48    | Daily except Sat. . | Brewer . . .    | Jun. Ag. Com. & D A  |
| 3     | Agriculture . . . . .                 | 38    | Tu. Th. & Sat. . .  | Mills . . . . . | Sen. Ag. . . . .     |
| 2     | Dairying . . . . .                    | 38    | Wed. and Fri. . .   | Linfield. . .   | " " . . . . .        |
| 2     | <i>Horticulture</i> . . . . .         | Sta.  | " " . . . . .       | Richman. . .    | " " . . . . .        |
| 2     | Veterinary Science . . . .            | 53    | " " . . . . .       | Fischer . . .   | " " . . . . .        |
| 5     | <i>Hydraulics</i> . . . . .           | 40    | Daily . . . . .     | Fortier . . . . | Jun. C. E. and M. E. |
| 5     | Commercial Law . . . . .              | 50    | Daily . . . . .     | Shepard. . . .  | Short Com. . . . .   |
| 5     | <i>Graphical Statics</i> . . . .      | 37    | " . . . . .         | Jenson. . . . . | Sen. C. E. and M. E. |
| 5     | <i>Grammar</i> . . . . .              | Chap. | " . . . . .         | Caine. . . . .  | Preparatory . . . .  |
| 5     | <i>Grammar</i> . . . . .              | 59    | " . . . . .         | Norwood. . .    | Sub-Freshmen . . .   |
| 5     | Sewing, etc. . . . .                  | 47    | " . . . . .         | Miss Bowen. .   | Special D. A. . . .  |

## SECOND HOUR.

|   |                                     |       |                     |                 |                       |
|---|-------------------------------------|-------|---------------------|-----------------|-----------------------|
| 5 | <i>Trigonometry</i> . . . . .       | 57    | Daily . . . . .     | Styer . . . . . | Sophomores . . . . .  |
| 5 | Rhetoric L to Z . . . . .           | 32    | " . . . . .         | MacEwan . . .   | Freshmen . . . . .    |
| 5 | <i>Algebra A to K</i> . . . . .     | 33    | " . . . . .         | Langton . . .   | " . . . . .           |
| 5 | Designing & Fitting . . . .         | 47    | " . . . . .         | Miss Bowen . .  | Jun. D. A. . . . .    |
| 3 | Agriculture. . . . .                | 38    | Tu. Th. & Sat . .   | Linfield . . .  | Junior Ag. . . . .    |
| 2 | Sociology . . . . .                 | 48    | Wed. and Fri. . .   | Paul. . . . .   | Sen. Ag. Com. & D A   |
| 3 | <i>Business Economics</i> . . . .   | 50    | Tu., Th., & Sat. .  | Shepard. . .    | Senior Commercial     |
| 4 | <i>Lectures on Cooking</i> . . . .  | 38    | Daily except Sat. . | Mrs. Cotey. .   | Sen. D. A. . . . .    |
| 3 | <i>Power Measurement's etc</i> . .  | 37    | Tu., Th. & Sat. .   | Jenson . . . .  | " " " . . . . .       |
| 2 | <i>Machine Design</i> . . . . .     | 37    | Wed. and Fri . .    | Jenson . . . .  | Sen. M. E . . . . .   |
| 5 | <i>Calculus</i> . . . . .           | 51    | Daily. . . . .      | Norwood. . .    | Junior Commercial.    |
| 4 | <i>Science of Book-keep'g</i> . . . | 50    | Daily except Sat. . | Shepard . . .   | Short Commercial . .  |
| 4 | Stenography . . . . .               | 61    | " " " . . . . .     | Dryden . . .    | " " . . . . .         |
| 5 | Geography . . . . .                 | Chap. | " " " . . . . .     | Caine . . . . . | Preparatory . . . .   |
| 2 | Elocution. . . . .                  | 59    | Daily. . . . .      | Miss Kenyon .   | S'b-Freshm'n No.1 & 2 |
| 3 | Industrial Drawing.. . . .          | 31    | Daily except Sat. . | Mayo . . . . .  | " " . . . . .         |
| 3 | Biology.. . . .                     | 53    | Tu., Th. & Sat. .   | Brewer . . . .  | " " . . . . .         |
| 5 | Sewing, etc. . . . .                | 47    | Daily . . . . .     | Miss Bowen . .  | Special D. A. . . .   |

## THIRD HOUR.

|   |                                    |       |                    |                 |                       |
|---|------------------------------------|-------|--------------------|-----------------|-----------------------|
| 3 | Elementary Physics . . . .         | 49    | Tu., Th. & Sat. .  | Jenson . . . .  | Freshmen . . . . .    |
| 2 | Essays and Debates . . . .         | 32    | Wed. and Fri. . .  | MacEwan. . .    | Sophomores . . . . .  |
| 3 | <i>Political Economy</i> . . . . . | 38    | Tu., Th. & Sat. .  | Paul. . . . .   | Sophomores . . . . .  |
| 3 | German . . . . .                   | 32    | " " " . . . . .    | MacEwan. . .    | Juniors . . . . .     |
| 2 | <i>Entomology</i> , . . . . .      | 63    | Wed. and Fri. . .  | Fischer . . .   | Sen. Ag. and D. A . . |
| 3 | Irrigation Engine'ng . . . .       | 40    | Tu., Th. & Sat. .  | Fortier . . . . | Senior C. E . . . . . |
| 3 | Fancy Work . . . . .               | 47    | " " " . . . . .    | Bowen. . . . .  | Senior D. A. . . . .  |
| 5 | Industrial Drawing. . . . .        | 31    | Wed and Fri . . .  | Mayo . . . . .  | Freshmen. . . . .     |
| 3 | English Classics. . . . .          | 49    | " " . . . . .      | Miss Kenyon .   | Preparatory . . . .   |
| 2 | Descriptive Geometry . . .         | 51    | " " . . . . .      | Norwood . . .   | Jun. C. E. and M. E   |
| 4 | Penmanship . . . . .               | 31    | Tu., Th. & Sat . . | Hyde . . . . .  | Elective . . . . .    |
| 5 | <i>Grammar</i> . . . . .           | Chap. | Daily . . . . .    | Caine. . . . .  | Sub-Freshmen No. 2    |
| 5 | <i>Arithmetic</i> . . . . .        | 59    | Daily . . . . .    | Langton. . . .  | " " 1. . . . .        |
| 5 | <i>Arithmetic</i> . . . . .        | 57    | Daily . . . . .    | Styer . . . . . | Preparatory . . . .   |
| 5 | Biology . . . . .                  | 53    | Daily . . . . .    | Brewer . . . .  | Elective Science      |
| 2 | Hygiene. . . . .                   | 38    | Wed. and Fri. . .  | Mrs. Cotey . .  | Short Course. . . .   |
| 5 | Sewing, etc. . . . .               | 47    | Daily . . . . .    | Miss Bowen. . . | Freshmen D. A. . .    |

(Over.)

# PROGRAMME CONTINUED.

## FOURTH HOUR.

|   |                       |       |                   |               |                      |
|---|-----------------------|-------|-------------------|---------------|----------------------|
| 2 | Ancient History . .   | 49    | Wed. and Fri..    | Caine . . .   | Freshmen . . . .     |
| 2 | Civil Government .    | 38    | " "               | Shepard . .   | Sophomores . .       |
| 3 | Logic.....            | 33    | Tu., Th. & Sat.   | Styer . . .   | Jun. Ag. Com. & D. A |
| 3 | German . . . . .      | 32    | " " "             | MacEwan       | All Seniors . .      |
| 3 | Organic Chemistry .   | 46    | " " "             | Widtsoe .     | Special.....         |
| 4 | Veterinary Science .  | 48    | Daily except Sat. | Fischer . . . | Sen Ag . . . . .     |
| 3 | Steam Engineering..   | 37    | Tu., Th. & Sat    | Jenson . . .  | Sen. M. E. . . . .   |
| 2 | Municipal Engineer'g  | 40    | Wed. and Fri...   | Fortier . . . | Sen C E and M. E..   |
| 2 | Zoology . . . . .     | 53    | Wed. and Fri...   | Brewer . . .  | Jun. Ag Com & D, A   |
| 3 | Com. Arithmetic.....  | 52    | Tu., Th. & Sat.   | Shepard .     | Commercial . .       |
| 2 | Type-writing.....     | 61    | Wed. and Fri...   | Dryden..      | Jun. Com.....        |
| 2 | Advanced Cooking .    | 10    | Wed. and Fri.     | Mrs Cotey     | Sen D. A . . . . .   |
| 5 | Arithmetic . . . . .  | 59    | Daily . . . .     | Langton . . . | Preparatory          |
| 3 | U. S. History . . . . | Chap. | Tu., Th., Sat.    | Caine . . . . | Sub-Freshmen No. 1   |
| 2 | English Classics . .  | Chap. | Wed. and Fri      | Kenyon . . .  | Preparatory . .      |
| 3 | Penmanship . . . . .  | 31    | Tu., Th. Sat .    | Hyde... . .   | Preparatory          |
| 5 | Sewing, etc . . . .   | 47    | Daily . . . .     | Miss Bowen    | Freshmen D. A.       |

## INTERMISSION.

|   |                 |                 |             |                    |
|---|-----------------|-----------------|-------------|--------------------|
| 5 | Arithmetic..... | Daily . . . . . | Langton . . | Sub-Freshmen No. 2 |
|---|-----------------|-----------------|-------------|--------------------|

Hours.

## SECOND TERM.—AFTERNOON.

|    |                                     |       |                  |              |                      |
|----|-------------------------------------|-------|------------------|--------------|----------------------|
| 10 | Shopwork( <i>ir'n &amp; steel</i> ) | 3     | Daily . . . .    | Mayo . . .   | Freshmen . . . .     |
| 6  | Chemical Analysis...                | 44    | Tu Th. & Sat..   | Widtsoe . .  | Sophomores . . . .   |
| 5  | Sewing . . . . .                    | 47    | Daily . . . .    | Bowen . . .  | Freshmen D A . .     |
| 4  | Electricity & Mag'tism              | 51    | Wed. and Fri..   | Jenson....   | Sophomores . . . .   |
| 10 | Drawing & Exp. work                 | 37    | Daily . . . . .  | Jenson. . .  | Sen M. E . . . . .   |
| 4  | Anatomy & Physiology                | 53    | Tu. Thu . . . .  | Brewer . . . | Jun. Ag D A & Com    |
| 4  | Horticulture . . . .                | 38    | Saturday . . . . | Richman. .   | Junior Agricultural  |
| 2  | Practice in Cooking                 | 10    | Wed. and Fri .   | Mrs. Cotey.  | Junior D A . . . .   |
| 4  | Mineralogy & Assay'g                | 14    | Wed. and Fri. .  | Widtsoe .    | Jun Ag Com. D A &    |
| 10 | Drawing & Designing                 | 40    | Daily . . . . .  | Fortier ...  | Junior C. E (Sen C E |
| 2  | Agricultural practice.              | Dairy | Tuesday ..       | Linfield . . | Senior Agricultural  |
| 10 | Prac. Book-keeping                  | 52    | Daily . . . . .  | Shepard..... | Sen & Short Course   |
| 4  | Veterinary Science                  | 48    | Wed. and Fri     | Fischer      | Sen. Ag . . . . .    |
| 2  | Elective . . . . .                  |       | Thursday . . .   | Agr. Dept.   | Sen Ag               |
| 10 | Pattern-making . . .                | 5     | Daily . . . . .  | Mayo.....    | Junior Eng . . . .   |
| 5  | Typewriting. . . .                  | 61    | Daily . . . . .  | Dryden . . . | Short Com . . . .    |
| 1  | Penmanship . . . .                  | 31    | Daily . . . . .  | Hyde . . . . | Short Com . . . .    |
| 10 | Woodwork . . . . .                  | 1     | Daily . . . . .  | Mayo . . . . | Sub-Freshmen . .     |
| 4  | Biology . . . . .                   | 53    | Thu. and Sat..   | Brewer       | Senior Ag . . . .    |
| 10 | Elective Biology....                | 53    | Daily . . . . .  | Brewer . .   | Elective Science .   |
| 5  | Sewing, etc.....                    | 47    | Daily . . . . .  | Miss Bowen   | Freshmen D. A..      |

TIMES

## Winter Course in Agriculture.

|     |                        |    |                 |               |
|-----|------------------------|----|-----------------|---------------|
| 5   | Dairying . . . . .     | 49 | Daily . . . .   | Linfield . .  |
| { 2 | Stockfeeding . . . . . | 49 | Tu. and Wed. .  | Fischer       |
| { 2 | Soils and Manures... } | 49 | Thur. and Fri . | Fischer . . . |
| { 1 | Entomology , . . . .   | 49 | Saturday . . .  | Fischer       |
| { 3 | Agriculture . . . . .  | 46 | Tu. Th. Sat     | Mills         |
| { 2 | Veterinary Science }   | 46 | Wed. and Fri    | Fischer       |
| 5   | Horticulture . . . .   |    | Daily.          | Richman.      |

Practical dairying on Mondays and milk testing and handling stock on each other afternoon of the week throughout the course.—LINFIELD.

## SHOPWORK.

The student begins with a term in wood-work, two hours daily. A bench and a complete set of carpenter's tools of the best make are assigned to each student. He works at exercises in planing, sawing, chiseling, rabbiting, plowing, splicing, mortising, tenoning, dove-tailing, framing, and paneling. Wood-turning follows, covering all the principles of straight turning, face plane, and chuck work.

In the second term forge work in iron and steel are given. Twenty-four power-blast forges, with anvils, vises, and all necessary tools afford opportunity for regular work at the forge in drawing, bending, twisting, cutting, punching, upsetting, welding, and the use of flatters, fullers, swages, etc. Tools and other articles are then made by the student.

Cabinet making is taught in the third term, and instruction in wood carving is given to students prepared to receive it.

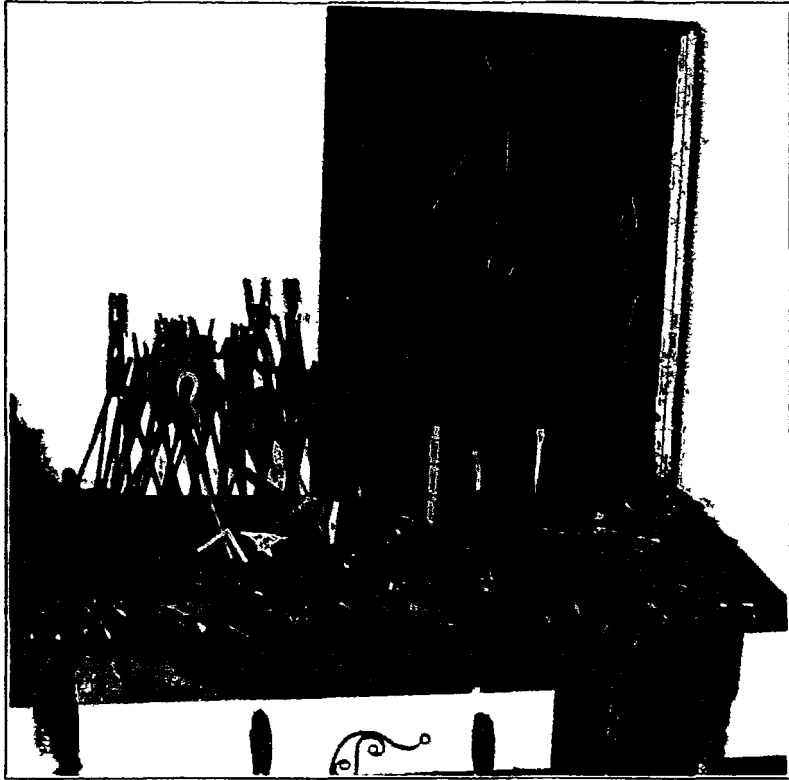
The second year of shopwork embraces pattern making, vise work in iron—chipping, filing, thread cutting, hand polishing, riveting, soldering—and machine work—straight, paper, and excentric turning, thread cutting, taper boring, milling on engine lathes, etc.

The shopwork has direct relations with the courses in industrial and mechanical drawing, which are taught at other hours during the same years. It is desirable, as explained elsewhere, to extend the courses of shopwork, so as to allow one year each to carpentry, iron work, and machine work, to make better mechanics than is possible with the present time.

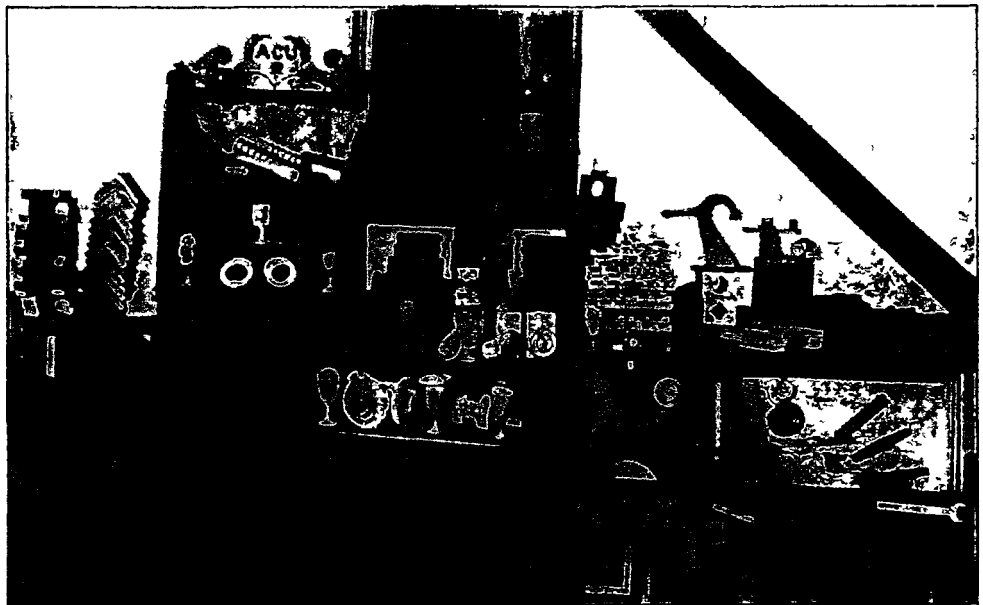
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## MILITARY INSTRUCTION.

The course is outlined in orders from the War Department, so that the instruction given is practically the same in over a hundred colleges, at which officers of the regular



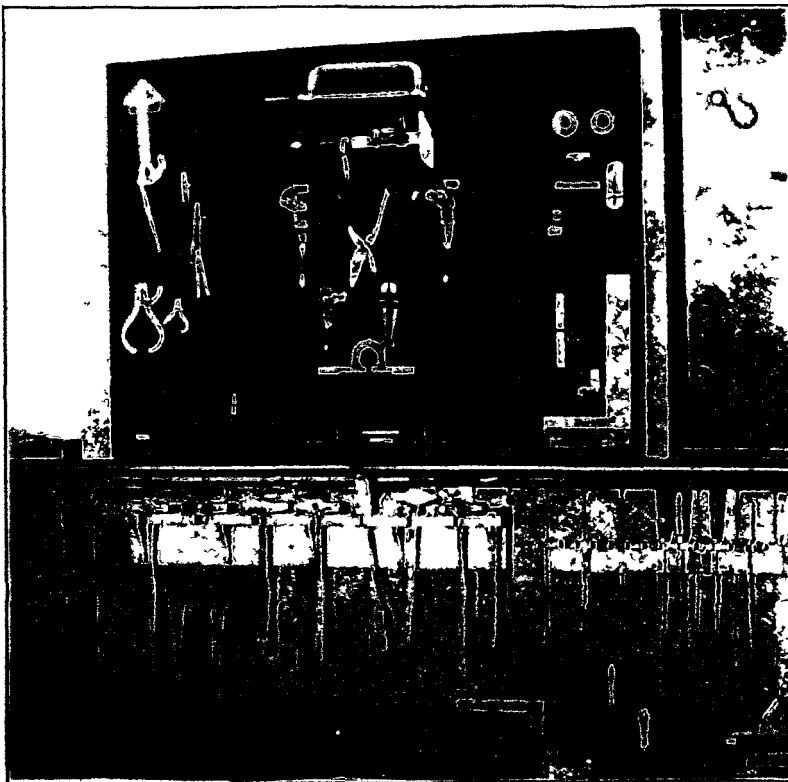
SAMPLES OF IRON WORK.



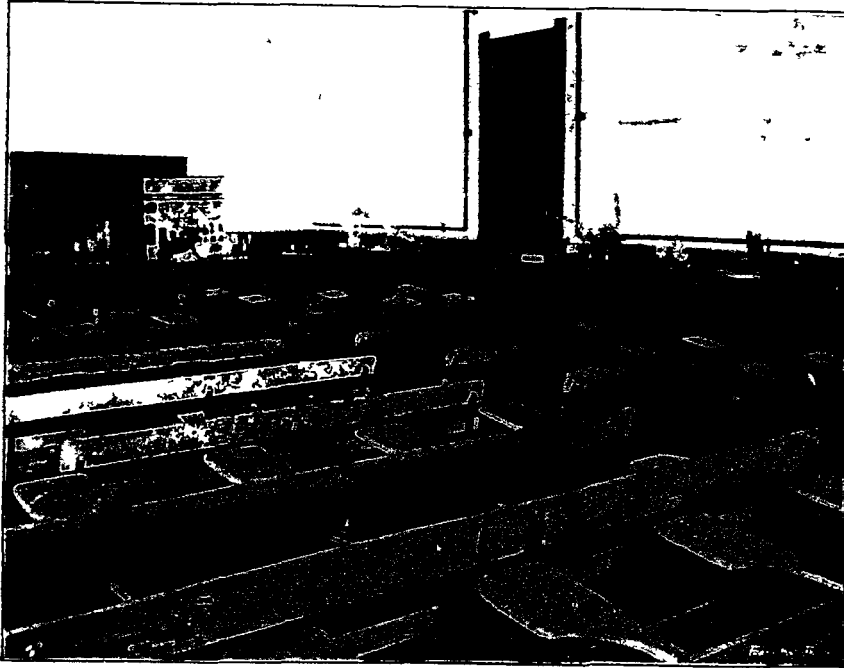
SAMPLES OF WOOD WORK



ENGINE ROOM.



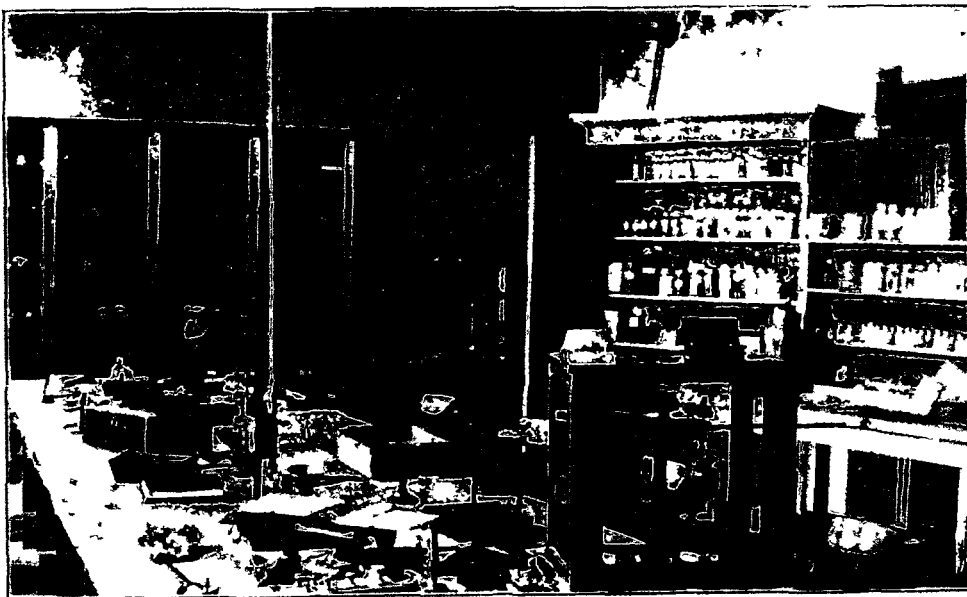
SECTION OF TOOL ROOM.



THE PHYSICAL LECTURE ROOM.



PHYSICAL LABORATORY.



MINERALOGICAL LABORATORY.



SCALE ROOM.

army are stationed. It embraces both practical and theoretical work. The practical part consists of infantry drill, beginning with the school of the soldier, and including drill by squad, company, and battalion; target practice, for which the government makes an annual allowance of ammunition; exercises in estimating distances; military signaling; also artillery drill. Theoretical instruction is given by lectures on the elements of Military Science and the Art of War, and by recitation in the Drill Regulations. The time devoted to it is a half hour daily. The government has furnished to the College one hundred and forty Springfield cadet rifles and the same number of sets of infantry accoutrements,—belts and cartridge boxes; also two three-inch rifled cannon, with equipments. If the attendance of students increases in the same proportion next year as it has during the present school year, more rifles will be needed and can no doubt be obtained on application. A large armory is needed so as to properly care for the arms. A suitable drill hall should be provided when the main building is completed. Inclement weather in fall frequently cuts short the time of out-door drill, while during the winter and early spring snow frequently prevents out-door exercises.

Lady students take a special course in military tactics, with light rifles, and in physical culture in the large gymnasium, which is well equipped for the purpose.

## FACULTY OF INSTRUCTION.

The Faculty of Instruction is as follows:

Joshua H. Paul, Ph. B., President; Professor of Philosophy, Political Science, and Sociology; Evert S. Richman, M. S. A., Professor of Horticulture and Entomology; John T. Caine, Jr., B. S., Professor of History, Principal of Preparatory Department; Alonzo A. Mills, B. Sc., Associate Professor of Agriculture, Joseph E. Shepard, B. S., Profes-

sor of Commercial Law, Commercial Economics, and Book-keeping; James Dryden, Teacher of Typewriting and Stenography; Elias J. MacEwan, M. A., Professor of English and German; F. W. Brewer, M. A., M. D., Professor of Biology and Sanitary Science; Miss Clare Kenyon, Teacher of Elocution and Physical Culture; Henry D. Styer, First Lieut. 13th Inf., U. S. A., Professor of Military Science and Mathematics; Samuel Fortier, B. Ap., Sc., Mem. Can. Soc. C. E., M. Am. Soc. I. E., Professor of Civil Engineering; F. B. Linfield, B. S. A., Professor of Dairying and Animal Husbandry; J. Walter Mayo, Teacher of Drawing and Shopwork; Willard S. Langton, Assistant Professor of Mathematics; John A. Widtsoe, B. S., Professor of Chemistry and Mineralogy; Mrs. Dalinda Cotey, A. M., Professor of Domestic Arts; Miss Sarah E. Bowen, Teacher of Sewing, Dressmaking, and Millinery; Joseph E. Hyde, Teacher of Penmanship and Vocal Music; Paul Fischer, B. Agr., M. V. D., Professor of Agriculture and Veterinary Science; Joseph Jenson, Professor of Physics and Mechanical Engineering; C. C. Norwood, A. B., A. M., Professor of Mathematics.

## CONCLUSION.

The progress already made by the College in the five years since its opening, warrants us, as we believe, in expressing without any reservation the belief that the College represents what is truly indispensable in the education of the sons and daughters of a practical people, without at the same time detracting from those branches of learning which tend to give culture, refinement, intelligent patriotism, and breadth of view to the student. The College is fulfilling to the satisfaction of its management the purposes for which it was created. That it meets also the approbation and the needs of the people generally, is apparent from its rapidly increasing influence, from the acknowledged evidences of the thoroughness of its work, from its steady

growth, from the sincere devotion to its weal which is manifested by its students and patrons, and from the kindly interest which it has inspired among the officials of the State and among the leaders of public thought. We therefore feel, as the servants of this commonwealth, to acknowledge to the Legislature the gratitude of the people and of ourselves individually for the generous support voted to the College in the past, while we commend to the friends of practical education a scrutiny of the outline of the College courses of study and training, and of the methods pursued in the different departments. We are confident that such investigation will result in a public judgment still more favorable to the institution, will powerfully augment its already rapid growth, and will continue to influence for good its future achievements.

Respectfully,

W. S. McCORNICK, President,  
A. GEORGE BARBER,  
M. D. LESSENGER,  
WM. P. NEBEKER,  
ACHILLES PERRIN,  
AARON F. FARR, JR.,  
B. H. ROBERTS,  
Board of Trustees.

# SIXTH ANNUAL REPORT

## OF THE EXPERIMENT STATION.

### FINANCIAL.

UTAH AGRICULTURAL COLLEGE EXPERIMENT STATION IN  
ACCOUNT WITH THE UNITED STATES APPROPRIA-  
TION, 1894-95.

|                                                                                                                                                                                   | Dr.         | Cr.         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| To Receipts from the Treasurer of<br>the United States as per appropri-<br>ation for fiscal year ending June 30,<br>1895, as per Act of Congress ap-<br>proved March 2, 1887..... | \$15,000.00 |             |
| By Salaries .....                                                                                                                                                                 |             | \$ 8,059.30 |
| Labor.....                                                                                                                                                                        |             | 301.29      |
| Publications .....                                                                                                                                                                |             | 1026.45     |
| Postage and Stationery .....                                                                                                                                                      |             | 196.40      |
| Freight and Express .....                                                                                                                                                         |             | 80.65       |
| Heat, Light and Water .....                                                                                                                                                       |             | 529.31      |
| Chemical supplies .....                                                                                                                                                           |             | 195.40      |
| Seeds, Plants and sundry supplies .....                                                                                                                                           |             | 575.44      |
| Fertilizers .....                                                                                                                                                                 |             | 12.94       |
| Feeding stuffs .....                                                                                                                                                              |             | 1,304.80    |
| Library.....                                                                                                                                                                      |             | 122.49      |
| Tools, Implements and Machinery .....                                                                                                                                             |             | 210.33      |
| Furniture and fixtures .....                                                                                                                                                      |             | 44.25       |
| Scientific Apparatus .....                                                                                                                                                        |             | 847.28      |
| Live Stock .....                                                                                                                                                                  |             | 714.07      |
| Traveling expenses .....                                                                                                                                                          |             | 7.60        |
| Contingent expenses.....                                                                                                                                                          |             | 22.00       |
| Building and repairs .....                                                                                                                                                        |             | 750.00      |
| Totals.....                                                                                                                                                                       | \$15,000.00 | \$15,000.00 |

*We the undersigned*, duly appointed Auditors of the corporation, do hereby certify that we have examined the books and accounts of the Utah Agricultural Experiment Station for the fiscal year ending June 30, 1895; that we have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been \$15,000.00 and the corresponding disbursements, \$15,000.00; for all of which proper vouchers are on file and have been by us examined and found correct.

*And we* further certify that the expenditures have been solely for the purposes set forth in the Act of Congress approved March 2, 1887.

Signed: A. G. BARBER,

[SEAL]

AARON F. FARR, JR.,

Auditors.

Attest, J. E. HYDE,

Custodian.

### STATION STAFF.

J. H. Paul, Director; E. S. Richman, Horticulturist and Entomologist; A. A. Mills, Agriculturist; J. A. Widtsoe, Chemist; F. W. Brewer, Biologist; S. Fortier, Hydraulic Engineer; F. B. Linfield, Dairyman; James Dryden, Clerk and Stenographer; Paul Fischer, Veterinarian; H. E. Hatch, Treasurer.

### PUBLICATIONS.

Four bulletins have been issued during the year, numbers 38, 39, 40, 41, summarized as follows:

#### BULLETIN No. 38.

Bulletin No. 38, contains condensed statements of the results of the tests made to determine the amount of seepage water, return waters from irrigated areas, and the underflow of streams.

Ogden Valley, Weber County, in 1894 irrigated 5601 acres. On July 6, there were 161 sec. feet flowing into the valley on the surface; of this amount 149 sec. feet were diverted and applied to the land, leaving a theoretical balance of 12 sec. feet as the outflow of the valley. The outflow obtained by measurement was on that date 164 sec. feet thus leaving a balance of 152 sec. feet as the result of seepage, from the adjacent hillsides, return waters from the 5601 acres irrigated and the underflow of Ogden river and its tributaries.

On August 16, there were 80 sec. feet flowing into the valley, 71 sec. feet used by the irrigators and 99 sec. feet flowing from the valley through Ogden canyon.

Similar tests were made in the Eden and Liberty districts, in Morgan County including the whole of the cultivated area of Morgan valley and that part of Weber County watered by the Weber river, all of which are given in the Bulletin named.

### BULLETIN No. 39.

Bulletin 39, Part I, Farm Irrigation, is summarized as follows:

1. On gravelly clay soil, two feet of water were required to produce the best results with grain. Where the soil was more sandy three and a half feet were required. It is thought that an average of two feet will be required for most of the ground that is to be brought under irrigation in the future in Utah.

2. For wheat, clover, and timothy, it was found that the intervals between irrigations could vary from six to fifteen days, favoring an interval of twelve days. If the interval was shortened to three days or lengthened to eighteen days the results were quite disastrous.

3. With either Fall or Spring wheat the yield increased from one irrigation up to three. The Spring wheat decreased in yield when irrigated more than three times.

4. With either wheat or timothy, where either a cement

tile or rock drain was used, sub-irrigation proved almost a complete failure, decreasing the yield of wheat by about 34 per cent.

5. Day irrigation gave better result than did night irrigation.

6. There was an increase of only about one-half bushel per acre for either early or for late irrigation over the usual time of irrigating.

7. There was an increase in the yield of timothy by irrigating in the fall, while the yield of wheat was slightly less from ground fall-irrigated.

8. In distributing water we found that the systems which distribute it with the greatest evenness over the surface gave the best results. It appears that our common systems may be greatly improved.

9. We have found at this Station that the yield of wheat, corn, and potatoes is decreased by the furrow system of irrigation as compared with the flooding system.

10. It is thought that much more of the ground, that is irrigated at all in Utah, is over-irrigated than under-irrigated.

11. The acre-foot, being a simple and definite unit, is recommended for general adoption for the division of water for agricultural purposes.

Part II, Orchard Irrigation, is summarized as follows:

1. In orchard irrigation, two irrigations are thought to be sufficient if enough water is applied each time to reach the deep roots.

2. In vineyard irrigation, sub-irrigation has given more fruit per vine than surface irrigation.

#### BULLETIN No. 40.

1. Pigs allowed to run at large over eighteen acres of good pasture and fed a full ration of grain, made the most rapid growth and required the least grain for 1 lb. of gain.

2. Pigs confined in moveable pens in the pasture grew more slowly than those running loose and required an increase of 29 per cent of grain to make 1 lb. of growth.

3. Pigs at pasture, fed under three different conditions gained 92.5 per cent more and ate but 2 per cent more than the pigs getting grass and otherwise similarly fed but confined in pens. The grain required to produce 1 lb. of gain was increased 40 per cent with those in pens over those at pasture.

4. Pigs fed but part rations of grain at pasture made satisfactory gains. Those at pasture getting the three-fourths grain ration gained more than those fed a full grain ration and grass, either in the yards or in the pens.

5. Pigs pastured without grain made about the same growth for three seasons in succession, this averaging .36 of a pound per day.

6. As nearly as can be judged, exercise alone increased the gain 22 per cent, and the amount eaten but 1.5 per cent, but decreased the amount required for one lb. of gain 22 per cent

7. Grass when cut and fed to pigs, whether fed in pens or yards, or with full or part grain ration, or without grain, proved to be of very little value.

8. Pigs confined in pens and fed on grass alone, mostly lucerne, for 91 days, lost over a quarter of a pound per day.

9. The average of the pigs fed on grass gained a little more than those without the grass, but not enough to pay for the extra feed in the grass.

10. With the pigs confined in the hog-house pens, the grass proved beneficial, while with those in the yard it proved detrimental, the latter requiring more grain to make a pound of pork with the grass than without it.

11. Pasturing either with full or with part grain rations, appeared to be by far the cheapest and best way of making pork.

NOTE. The grass is a mixture of eight varieties in which lucerne constitutes at least one half.

#### BULLETIN No. 41.

The first section of Bulletin No. 41, treats of the localities in which Tuberculosis is prevalent, its comparative

rarity in the Rocky Mountain district, but shows that even there it can be found too frequently, and that great care must be taken to keep the human beings and cattle in their present state of comparative exemption.

The cause of the disease, the prevailing symptoms, and the factors in the spread of the disease are discussed; and the discoveries that have been made in Germany and elsewhere are alluded to.

The value of tuberculin as a diagnostic is thoroughly accepted, and experiments have been made with it on some of the cattle in the Experiment Station herd. The preparation of tuberculin is described, the mode of conducting the experiments, the precautions necessary, and the results, are fully set forth. A few of the animals were killed, and the appearance of the livers and other internal organs, upon examination after death, is given, showing the reliability of tuberculin as a diagnostic agent.

A few remarks are made as to the experiments conducted in other states and their results, and the general tenor of the information collected by the Department of Agriculture at Washington, D. C.

Suggestions as to the disinfection of barns, etc., and as to the sanitary management of cattle, as concurred in by the most eminent authorities, are made.

Tabulated statements of the experiments and their results are given.

## FINANCIAL STATEMENT.

Of the Agricultural College and Experiment Station of Utah, for the Biennial Period Commencing January 1, 1894, and ending December 31, 1895.

|                                                                                             |            |                    |
|---------------------------------------------------------------------------------------------|------------|--------------------|
| Cash and unredeemed Territorial warrants on hand as per report of December 31st, 1893. .... | \$16247 16 |                    |
| Received from United States for College .....                                               | 41000 00   |                    |
| Received from United States for Experiment Station. ....                                    | 30000 00   |                    |
| Received from Territory for College. ....                                                   | 15000 00   |                    |
| Received from Entrance Fees and Miscellaneous Receipts. ....                                | 7253 70    |                    |
| <b>Total. ....</b>                                                                          |            | <b>\$109500 86</b> |
| Disbursed from Government Fund as per schedule A. ....                                      | 42738 94   |                    |
| Disbursed from Experiment Station Fund as per schedule B .....                              | 36573 72   |                    |
| Disbursed from Territorial Fund as per schedule C. ....                                     | 21861 90   |                    |
| <b>Total . ....</b>                                                                         |            | <b>\$101174 56</b> |
| Cash and unredeemed Territorial warrants now on hand. ....                                  |            | <b>8326 30</b>     |

### Statement of the Different Funds.

AS THEY APPEAR DECEMBER 31, 1895.

|                                                                                                  | Rec'd       | Disburs'd.  | Bal. Cr.   |
|--------------------------------------------------------------------------------------------------|-------------|-------------|------------|
| <b>COLLEGE GOVERNMENT FUND.</b>                                                                  |             |             |            |
| Balance Credit December 31st, 1893. ....                                                         | \$17748 18  |             |            |
| Received from the United States for College .....                                                | 41000 00    |             |            |
| Disbursed from this fund during biennial period ending December 31st, 1895 .....                 |             | \$42738 94  |            |
| Required amount on hand in this fund .....                                                       |             |             | \$16009 24 |
| <b>EXPERIMENT STATION FUND.</b>                                                                  |             |             |            |
| Balance Credit December 31st, 1893 .....                                                         | 2044 20     |             |            |
| Received from United States for Experiment Station .....                                         | 30000 00    |             |            |
| Received from sale of Agricultural and Horticultural Products. ....                              | 5776 64     |             |            |
| Disbursed from this fund during biennial period ending December 31, 1895 .....                   |             | 36573 72    |            |
| Required amount on hand in this fund. ....                                                       |             |             | 1247 12    |
| <b>TERRITORIAL FUND.</b>                                                                         |             |             |            |
| Unredeemed Territorial warrants on hand December 31, 1893 .....                                  | \$16125 00  |             |            |
| Cash on hand January 1, 1894. ....                                                               |             | 122 16      |            |
| Of above warrants there have been redeemed to this date, December 31, 1895. ....                 |             | 10750 00    |            |
| Received in Territorial warrants from appropriation of 1894 .....                                | \$15000 00  |             |            |
| Of these there have been redeemed to this date, Dec. 31, 1895 .....                              | 13600 00    |             |            |
| Warrants still unredeemed on hand. ....                                                          | 6775 00     |             |            |
| Received from Entrance Fees and Miscellaneous receipts .....                                     | 4478 01     |             |            |
| This fund was overdrawn on December 31, 1893 .....                                               |             | 22793 33    |            |
| Disbursed from this fund during biennial period ending December 31, 1895. ....                   |             | 21861 90    |            |
| Deficit, or amount this fund is now overdrawn \$8930 06                                          |             |             |            |
| Total required amount on hand in Government and Experiment Station Funds December 31, 1895 ..... |             |             | \$17256 36 |
| Amount Cash and Territorial warrants actually on hand December 31, 1895 .....                    |             |             | 8326 30    |
| Deficit .....                                                                                    |             |             | \$ 8930 06 |
| Balance. ....                                                                                    | \$132294 19 | \$123967 89 |            |
|                                                                                                  |             | 8326 30     |            |
|                                                                                                  | \$132294 19 | \$132294 19 |            |

We, the undersigned, duly appointed Auditors of the Corporation, do hereby certify that we have examined the books and accounts of the Agricultural College of Utah for the biennial period ending Dec. 31, 1895, that we have found the same well kept and classified as above, and for all of which proper vouchers are on file and have been by us examined and found correct.

[SEAL]

A. G. BARBER,  
AARON F. FARR, JR.,

Auditing Committee.

Attest

J. E. HYDE, Secretary.

## RECAPITULATION—TERRITORIAL FUND.

|                                                                                                     |          |            |
|-----------------------------------------------------------------------------------------------------|----------|------------|
| The foregoing statement shows that<br>on Dec. 31, 1893, the Territorial<br>Fund was overdrawn ..... |          | \$22793 33 |
| But there was then on hand Territorial<br>warrants not yet cashed amounting to \$16125.00           |          |            |
| There was cash on hand .....                                                                        | 122 16   | 16247 16   |
| So that the actual deficit in the Terri-<br>torial Fund on Dec. 31, 1893, was                       |          | 6546 17    |
| There has been expended from this<br>Fund from December 31, 1893 to<br>December 31, 1895....        |          | 21861 90   |
| Total expenditure, including deficit                                                                |          | \$28408 07 |
| To meet this expenditure there was<br>the Territorial appropriation for<br>1894-5 of .....          | 15000 00 |            |
| And the College miscellaneous fund,<br>derived from entrance fees and other<br>sources, of .....    | 4478 01  | 19478 01   |
| So that the actual deficit in the Terri-<br>torial Fund to date is .....                            |          | \$ 8930.06 |

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SCHEDULE A.

*Expenditures from Government Fund for biennial period,
ending Dec. 31st, 1895.*

Agriculture, Salary	\$ 4907 41
“ apparatus	328 78
“ text and reference books ..	50 00
“ stock and material	41 78
Mechanic Arts, salary	5548.67
“ apparatus	931 74
“ machinery	746 80
“ text and reference books	1.69
“ stock and material	252 55
English Language, salary ..	10349.25
“ text and reference books ..	64 31
Mathematical Science, salary	5364 60
“ apparatus	31 00
“ stock and material ..	8 32

Physical Science, salary	2419 70
" " apparatus	656 57
" " text and reference books	19 32
" " stock and material	265 88
Natural Science, salary	2793 97
" " apparatus	367 34
" " text and reference books ..	3 35
" " stock and material	5 50
Economic Science, salary	7240 96
" " apparatus	173 78
" " stock and material....	165 67
Total.....	\$42738.94

SCHEDULE B.

Expenditures from Experiment Station Fund for biennial period ending Dec. 31st, 1895.

Agriculture, live stock	\$1207.80
" equipment	386.44
" seeds, plants, and supplies.....	477.45
" labor	6207.80
" tools, implements, and machinery	
repairs	158.68
" fertilizers	7 32
" feeding stuffs.....	2202 23
" current expense ..	714.97
" tools, implements, and machinery ...	69 05
" department stationery	8 25
Horticulture, fertilizers	5 62
" equipment	19 34
" seeds, plants, and supplies.....	372 90
" labor.....	1486.58
" tools, implements, and machinery ...	79.49
" " " repairs	5.12
" current expense.....	193.82
Chemicals	139.68
Chemistry, equipment.....	51.96
" supplies	359.27
" scientific apparatus.....	186 38
" labor	458 15
" department stationery.....	11.50
" current expense.....	22 70

Salaries	12980.94
Buildings and repairs	1968 80
Publications and advertising	2905.69
Postage and stationery	281.55
Office expense	22 56
Light, heat, and water	815 75
Janitor work	136.31
Library	209 96
Biology, equipment	189.80
" sundry supplies	33.17
" scientific apparatus	696 45
Dairy, equipment	786 40
" tools, implements and machinery	126 94
" supplies	106 92
Freight and express	108 84
Dairy tools and machinery repairs	3 88
Dairy labor	5.03
Dairy live stock	36 00
Hydraulics and irrigating engineering supplies	4 55
Traveling expenses	128 90
Contingent expenses	35.72
Furniture and fixtures	143 60
Labor	13 46
	\$36573 72

SCHEDULE C.

*Expenditures from Territorial Fund for biennial period
ending Dec. 31st, 1895.*

Fire Insurance on Buildings	\$ 1123.77
Mechanic Arts Supplies—Iron material for forging, wood for carpentry exercises, etc	84.89
Chemical Supplies—Chemicals for class work in assaying, etc	53.18
Telephone and Telegraph	197 45
Military Supplies—Freight on ammunition for rifle and cannon practice, etc	85 15
Domestic Arts Supplies—Soap, etc., for laundry, dishes, utensils, and apparatus	442 51
Care of College Grounds—Irrigation, tree planting, fencing, etc	337 55
Office Expense—President's and Secretary's	67.87
Desks and School Furniture	1201 03

Furniture and Furnishings of Class Rooms and Departments—Blinds, tables, chairs, shelving	733.15
Coal and Wood.....	2589.44
Water—Water tax and expense of water system	1144.54
Trustees Expense—Mileage, per diem, and committee work	1456.30
College Secretary and Book-keeper.....	1822.50
Janitor—Work and supplies.....	1584.39
Fireman and Engineer—Including repairs on steam heating apparatus	1091 88
Publications and Advertising	1255.43
Postage and Stationery.....	695.21
Interest, Exchange, and Discount on Territorial Warrants	1394 87
Freight and Express	174.16
Repairs to Building—Locks, glass, carpentry, kalsomining, plastering etc, ..	828.95
School Supplies—Chalk, erasers, drawing material, etc.....	54 00
Extra Steam Heating Apparatus	881.50
Gymnasium Equipment.....	225.96
Traveling Expenses.....	163 65
Commercial Department Apparatus — Letter press, bank counter, etc.....	72.55
Salary for Teaching Branches not named in Congressional Law.....	360.00
Building Coal Cellar and Dissecting Room	694.05
Library Expense—Shelving, reading tables, etc.	226 04
Dairy Current Expense.....	33 50
Student Labor	131 40
Military Band Expense	13 50
Recording Deeds	8.10
Preparation of Museum Specimens	56.33
Territorial Fair, Exhibit	121 76
Incidental Expenses	455 34
Total Territorial Expense, two years...	\$21861 90

CLASS WORK OF STUDENTS.—BOTANY.



ROBINIA PSEUDACACIA, L. (*Locust.*)

1. A flowering branch. 2. Diagram of a flower. 3. Front view of flower. 4. A staminal tube. 5. Vertical section of a pistil. 6. An ovule.

AUGUST J. HANSEN.

CLASS WORK OF STUDENTS.—BOTANY.

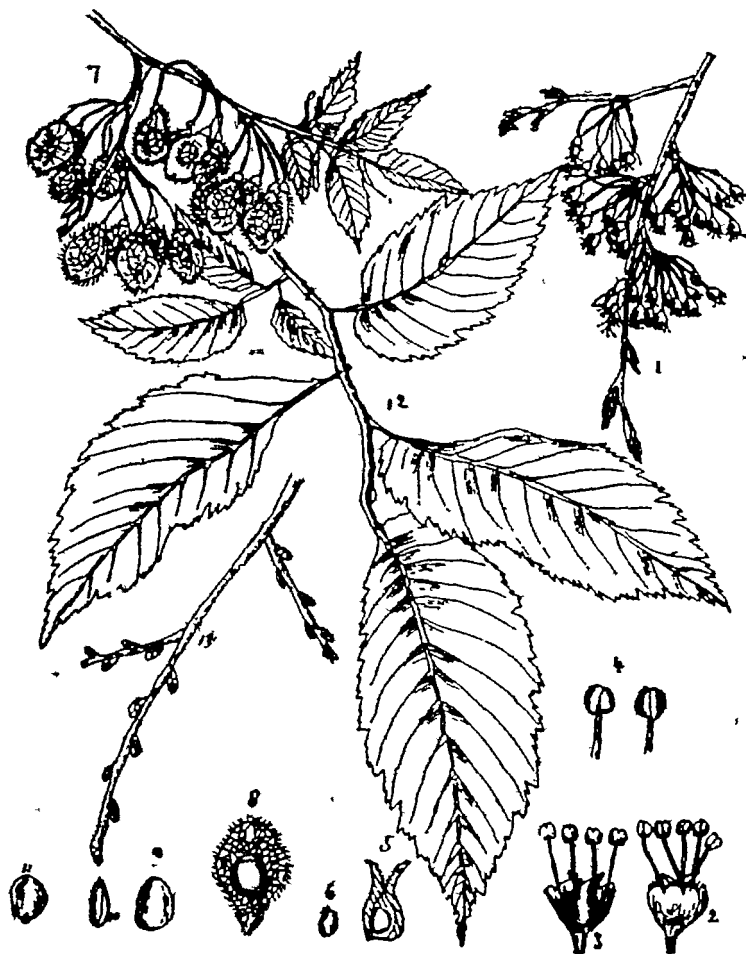


ACER GLABRUM, (Maple) Torr.

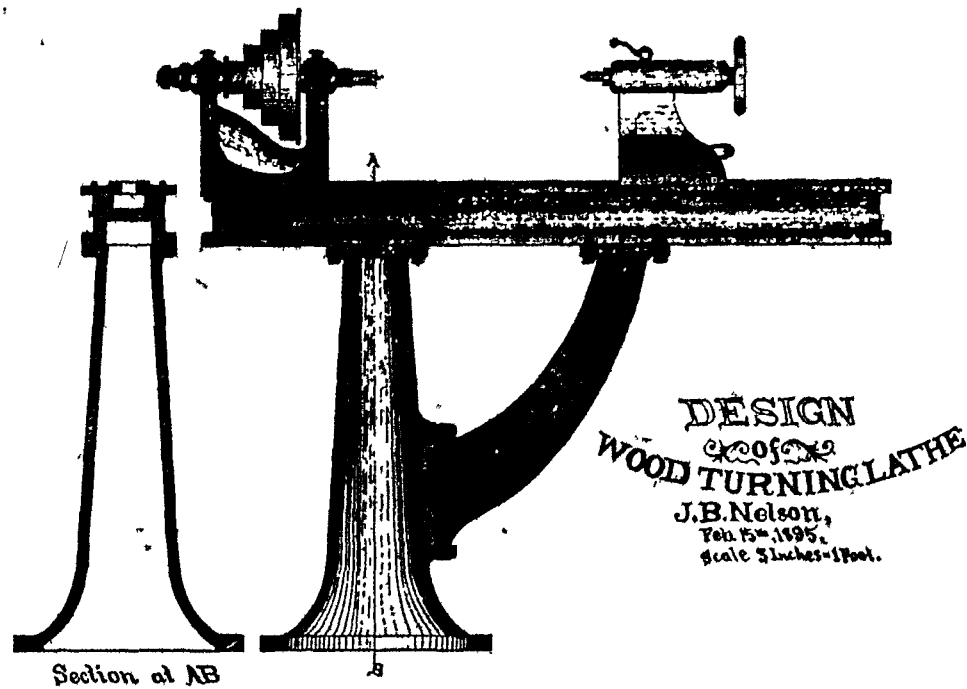
1. A branch with staminate flowers. 2. A branch with pistillate flowers. 3. Vertical section of a staminate flower. 4. Vertical section of a pistillate flower. 5 & 6. Fruiting branches. 7. Vertical section of a fruit. 8. Vertical section of a seed. 9. An embryo. 10. A three parted leaf. 11. A winter branchlet.

ETHEL BULLEN.

CLASS WORK OF STUDENTS.—BOTANY.

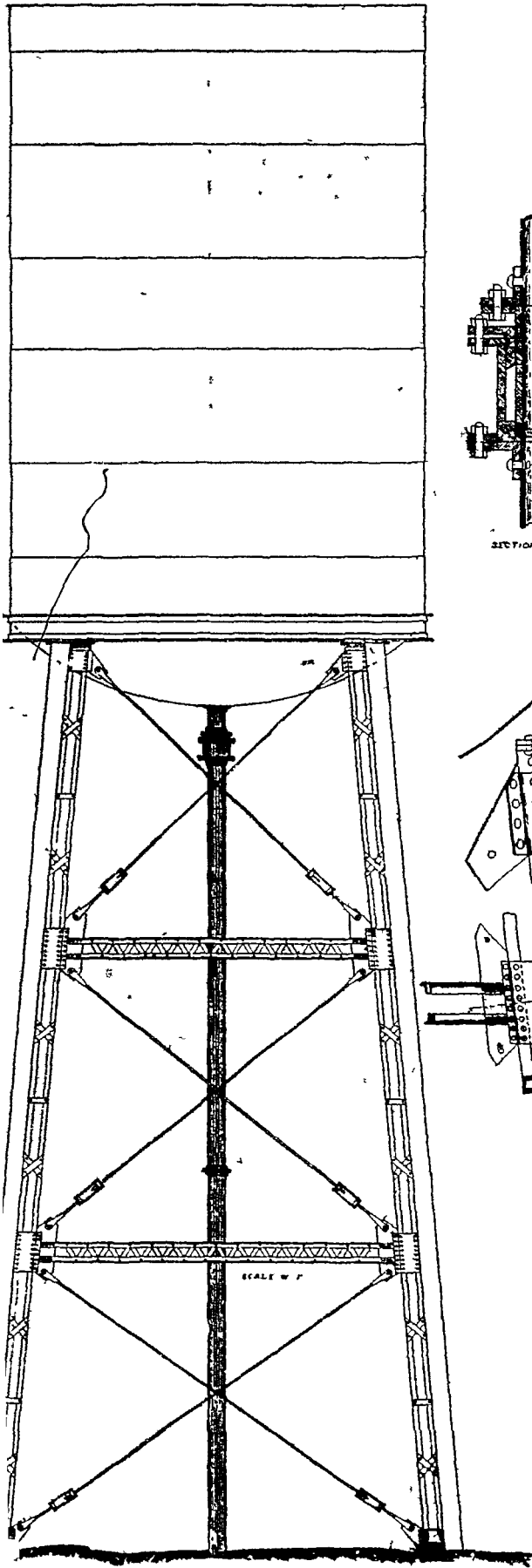


ULMUS AMERICANA (elm), showing flower and fruit structure.
GEORGIANA MCCAUSLAND.

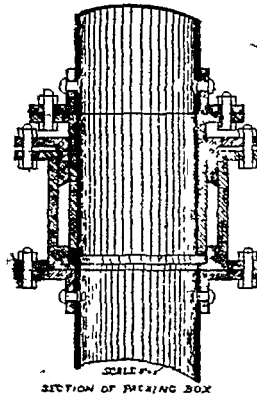


CLASS WORK OF STUDENTS.--MECHANICAL ENGINEERING.

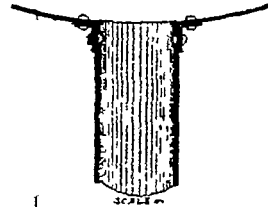
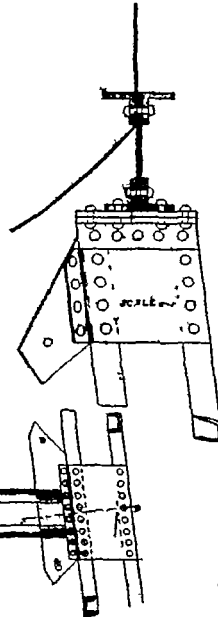
CLASS WORK OF STUDENTS—CIVIL ENGINEERING.



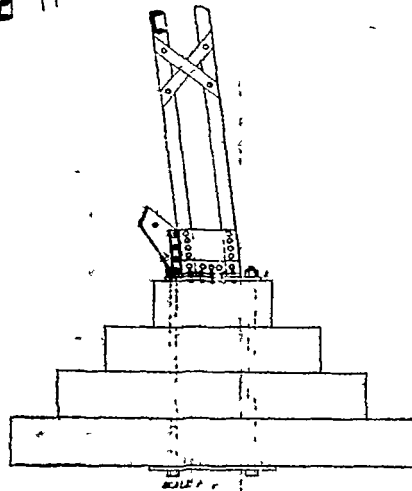
*Tank on Trestles
Showing
Construction of Columns
and
Bracing.*



SECTION OF PACKING BOX



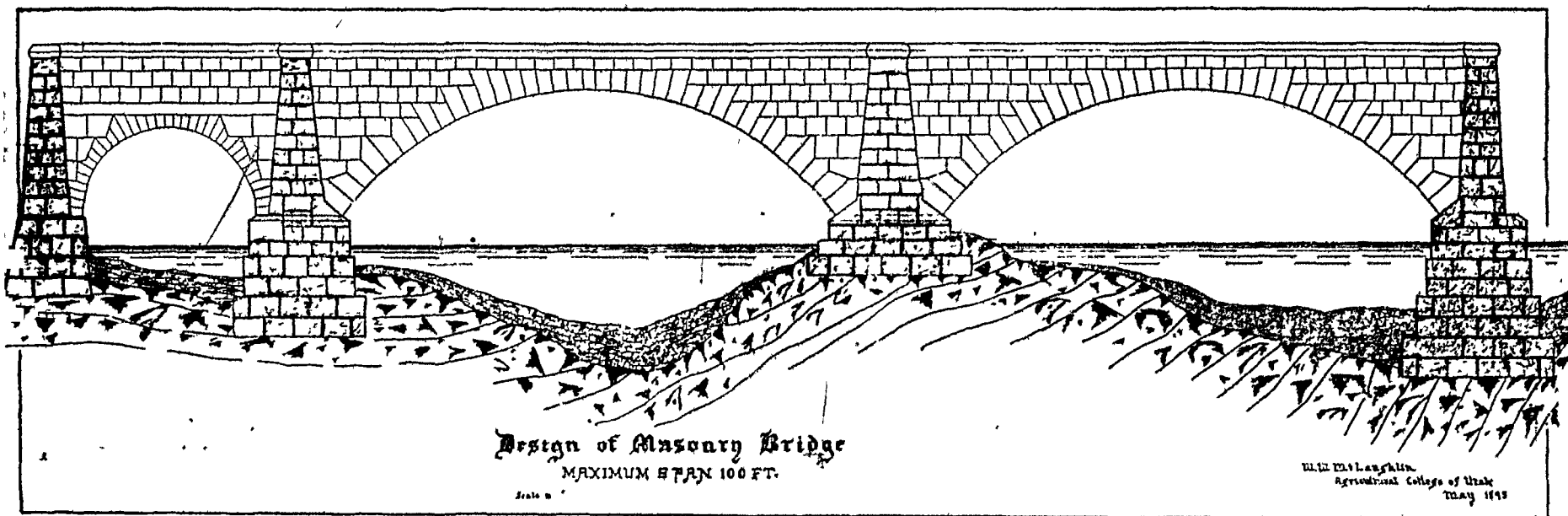
SCALE 1/2"



SCALE 1/2"

W.B. Duggall

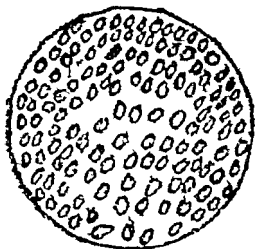
April 1901



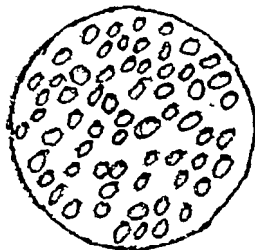
CLASS WORK OF STUDENTS.—CIVIL ENGINEERING.

CLASS WORK OF STUDENTS.—BIOLOGY.

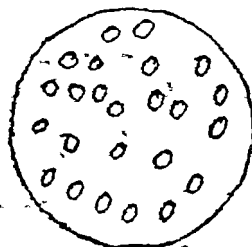
FAT GLOBULES IN



CREAM.



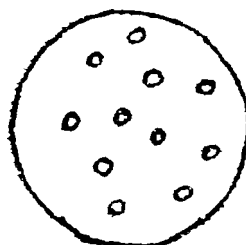
NORMAL MILK.



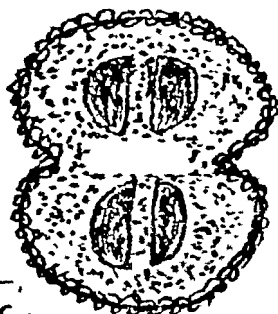
SKIM MILK



POTATO STARCH.



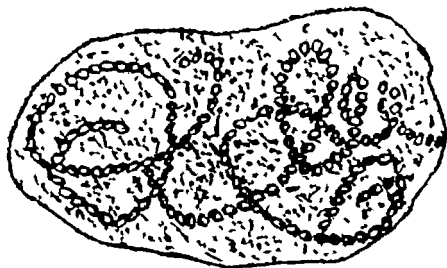
BUTTER MILK.



DESMID.—
COSMARIUM
PERFORATUM.



DESMID.—
CLOSTERIUM
LUNULA.



NOSTOC.



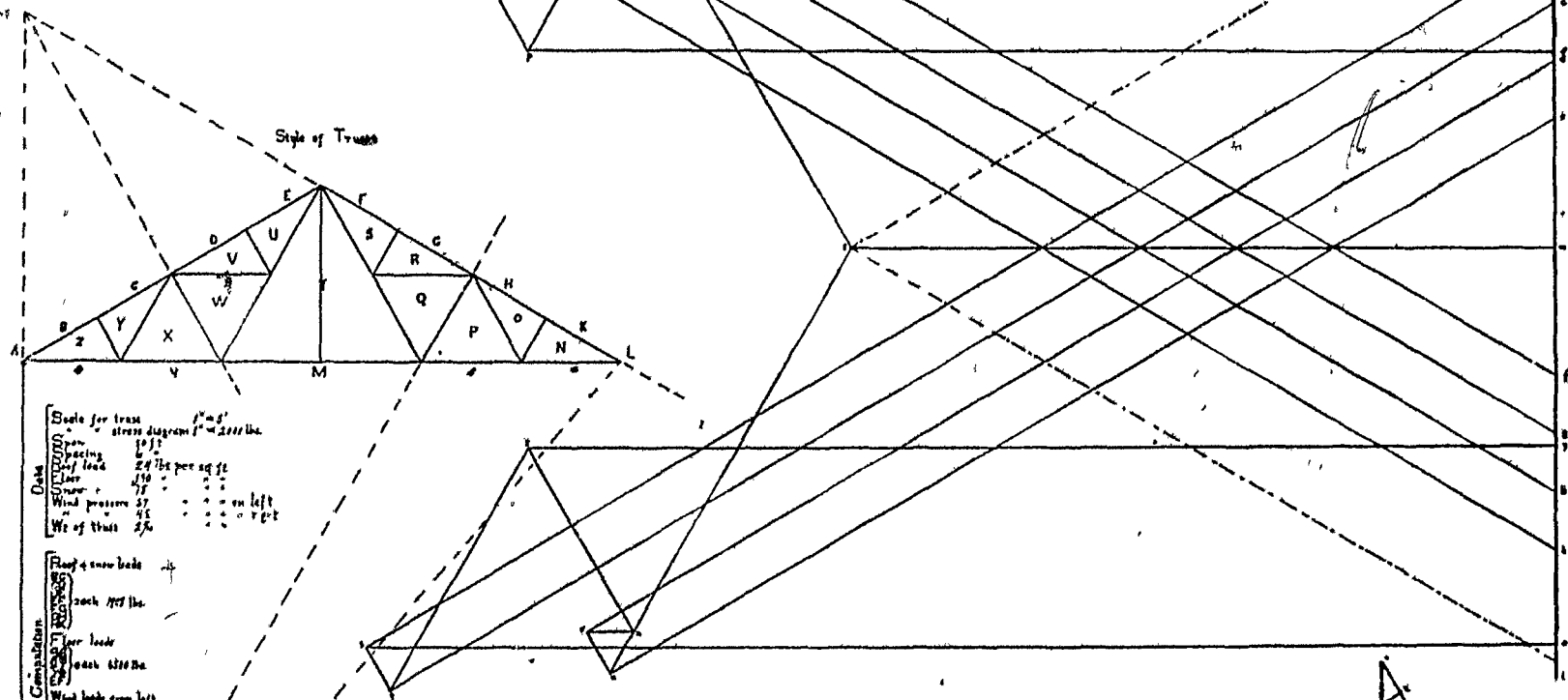
DIATOM.

NAVICULA.

R. ... Merrill.

ROOF TRUSS

Loads And Supporting Forces
Compression
Tension



Scale for trace $1'' = 1'$
stress diagram $1'' = 2000$ lbs.

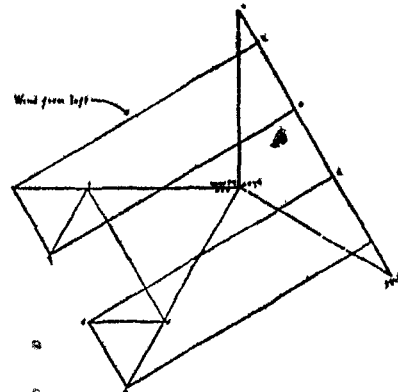
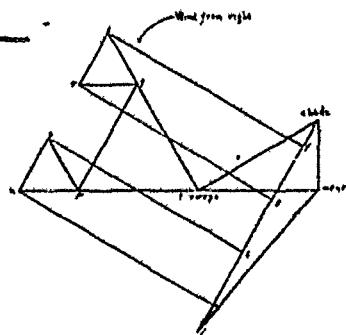
pen 10 ft
spacing 10 ft
leaf load 24 lbs per sq ft
live 150 ft
dead 75 ft

Wind pressure 37 " " " on left
 41 " " " on right
Wt of truss 2%

Loads by Computation	Roof + snow loads	each 1707 lbs.
Per loads	each 6380 lbs.	
Wind loads from left	each 8825 lbs.	
Wind loads from right	each 1742 lbs.	
Max. load on supports	each 9974 lbs.	

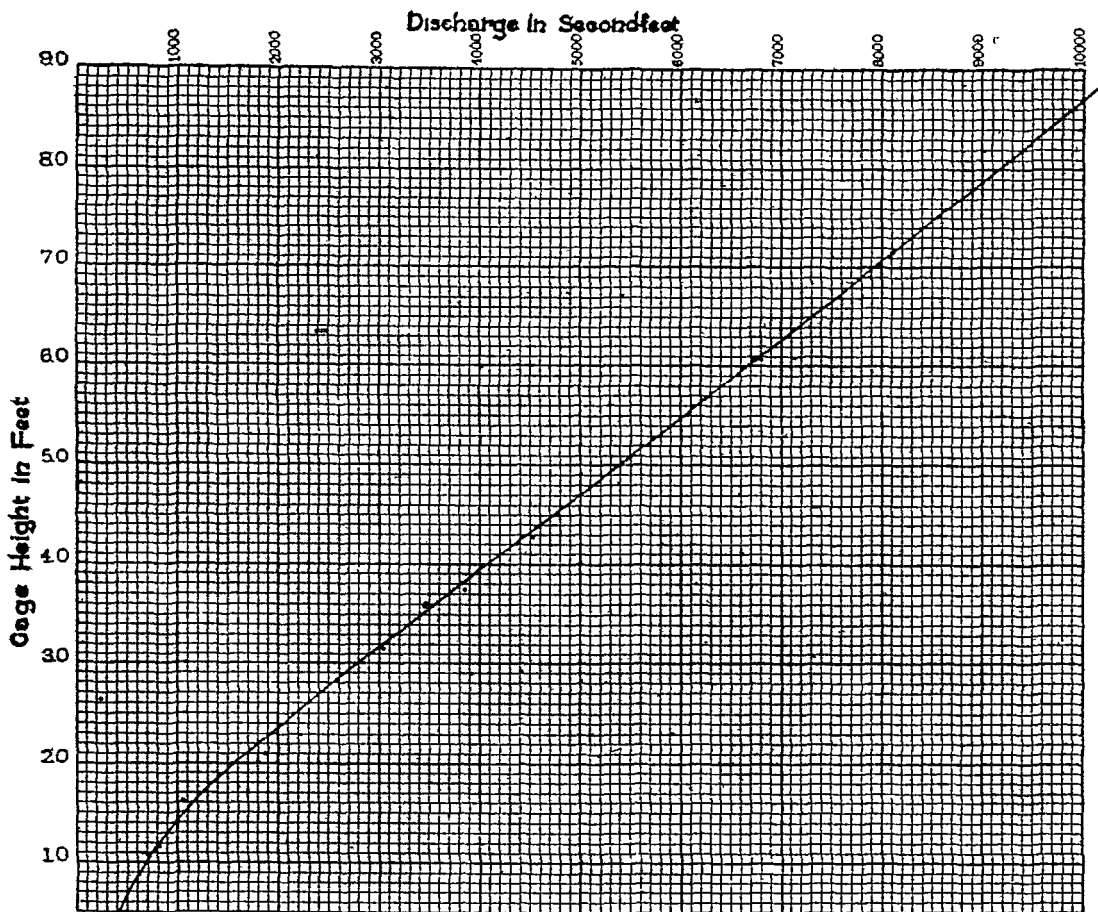
Month	SIGNALS due to			Maximum STRESS
	Vertical load	Wd from below	Wind from above	
Jan.	10000	1150	1000	10000
Feb.	10000	1150	1000	10000
Mar.	10000	1150	1000	10000
Apr.	10000	1150	1000	10000
May	10000	1150	1000	10000
June	10000	1150	1000	10000
July	10000	1150	1000	10000
Aug.	10000	1150	1000	10000
Sept.	10000	1150	1000	10000
Oct.	10000	1150	1000	10000
Nov.	10000	1150	1000	10000
Dec.	10000	1150	1000	10000

Wind Pressure Diagrams



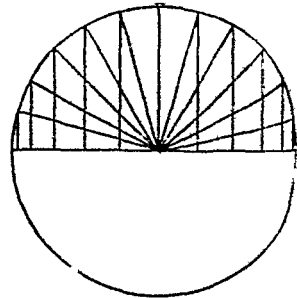
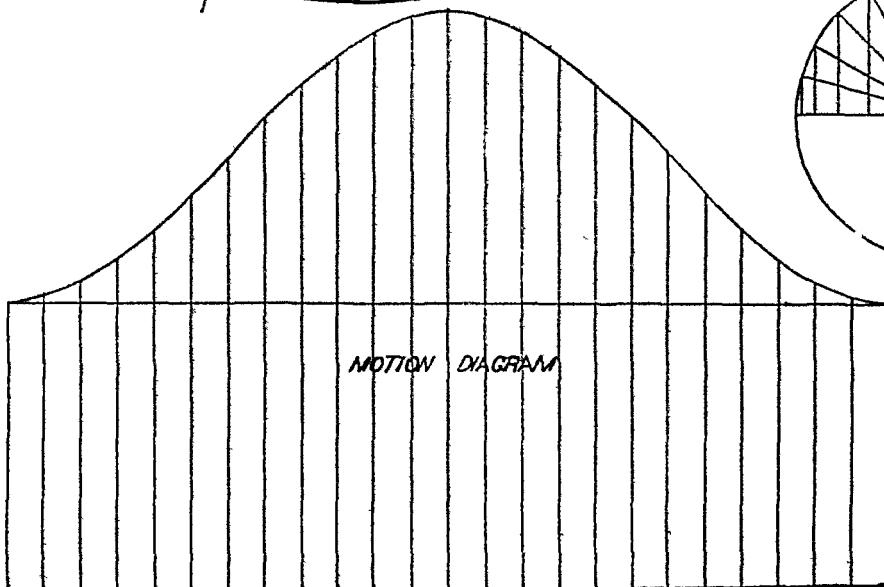
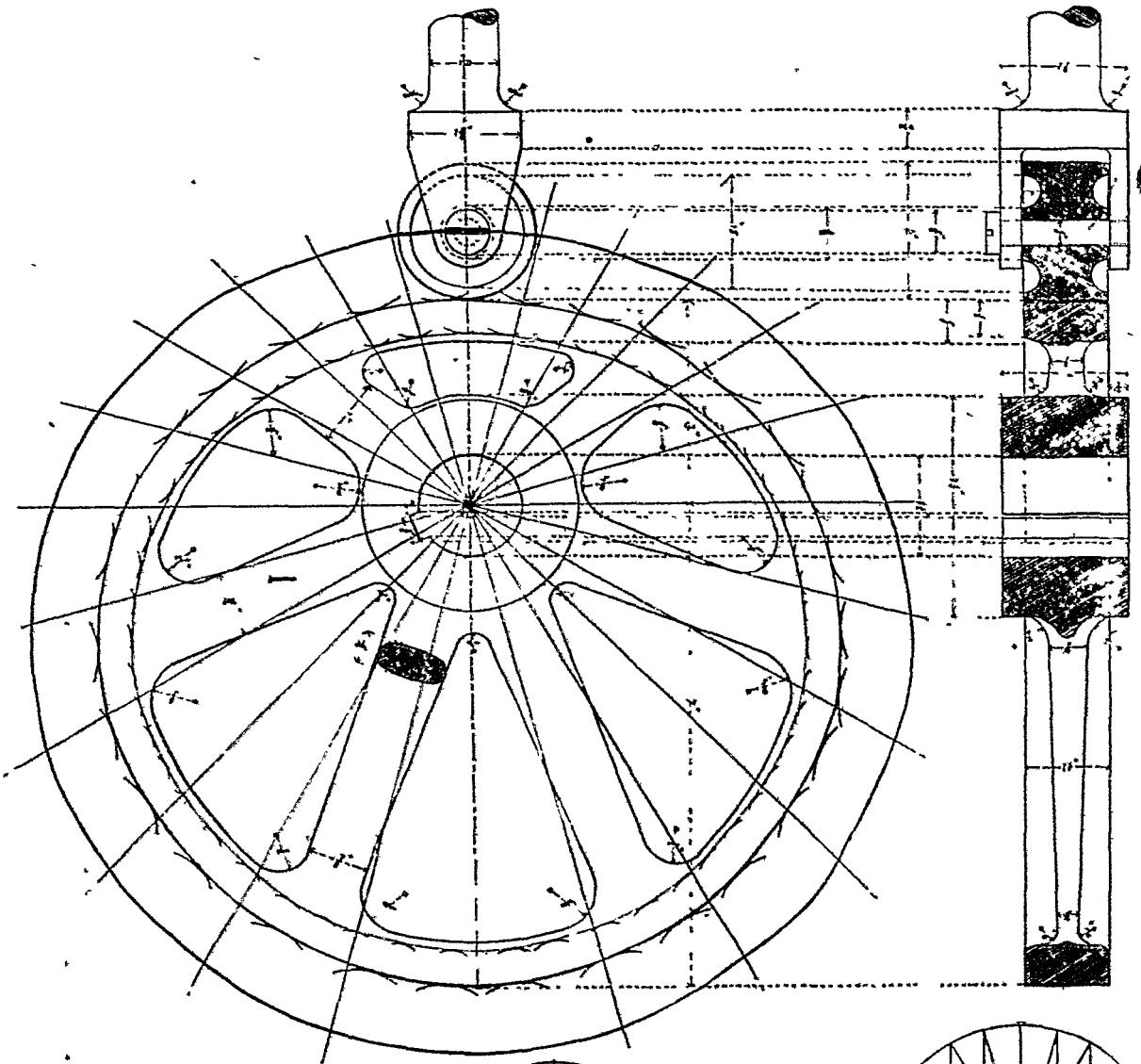
Nov 20th 1975
JLRhead

CLASS WORK OF STUDENTS.—CIVIL ENGINEERING.

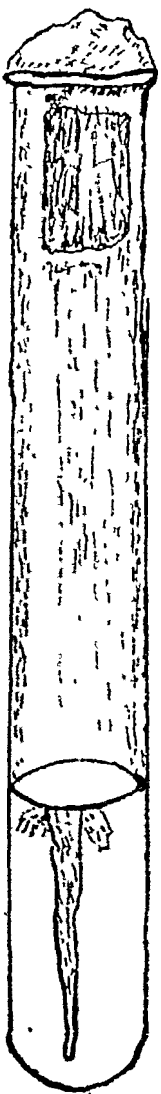


Rating Curve of Gaging Station at Collinston, Utah for 1894-5

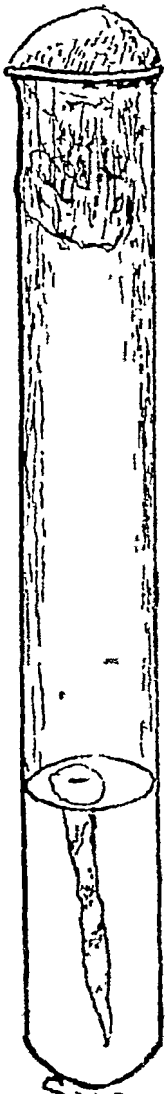
CLASS WORK OF STUDENTS.--MECHANICAL ENGINEERING.
HARMONIC MOTION CAM.



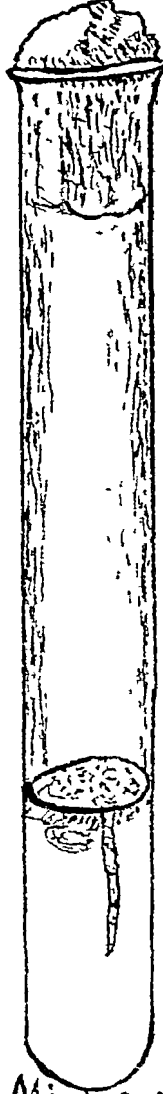
Tube Cultures of Bacteria



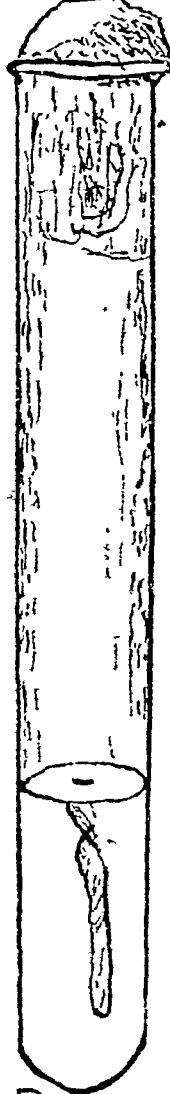
Vibrio Cholera



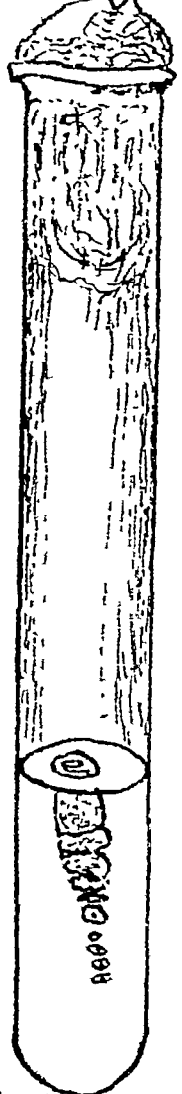
Sarcina Alba



Micrococcus Cinereus

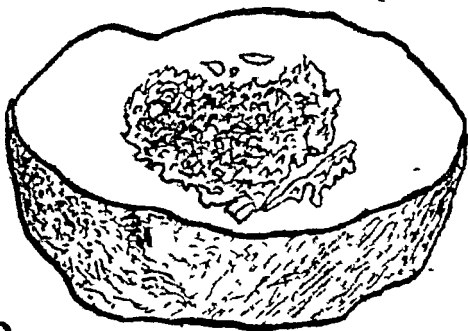


Rouget



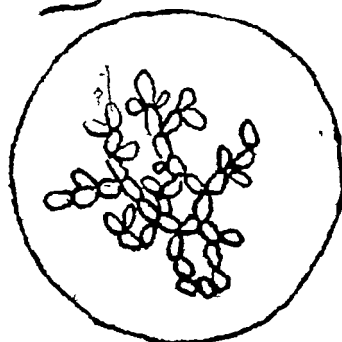
Actinomyces

Potato Culture



Bacillus Prodigiosus

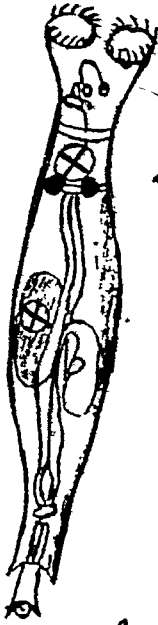
Yeast



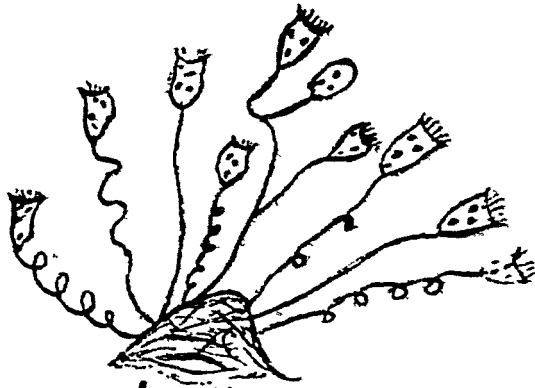
Magnified 250 Times

Arthur Barrett

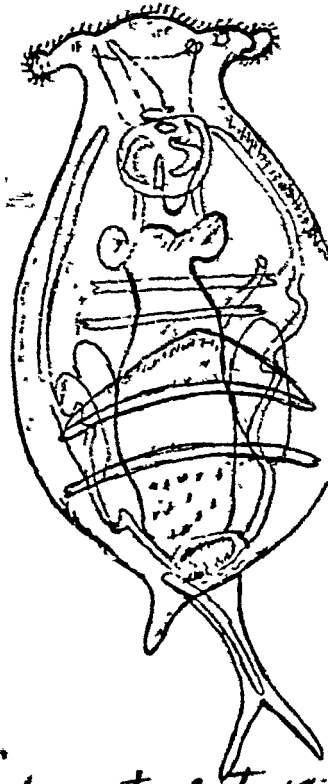
CLASS WORK OF STUDENTS—ZOOLOGY.



Rotifer vulgaris



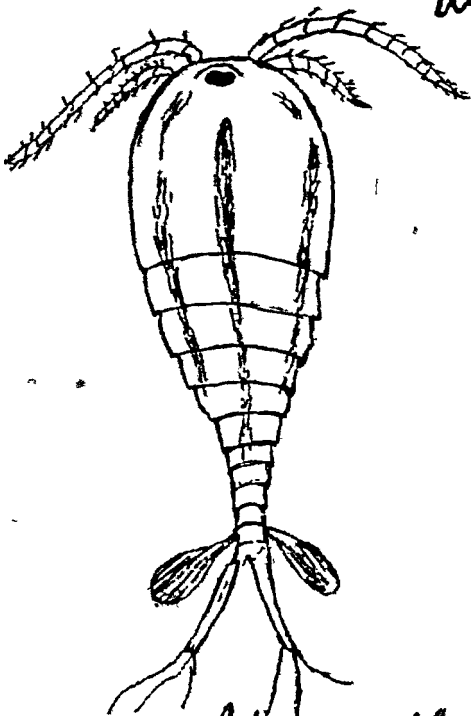
Vorticella



Polommata cinctura



Vorticella verucosa



Cyclops



Charonotus larva

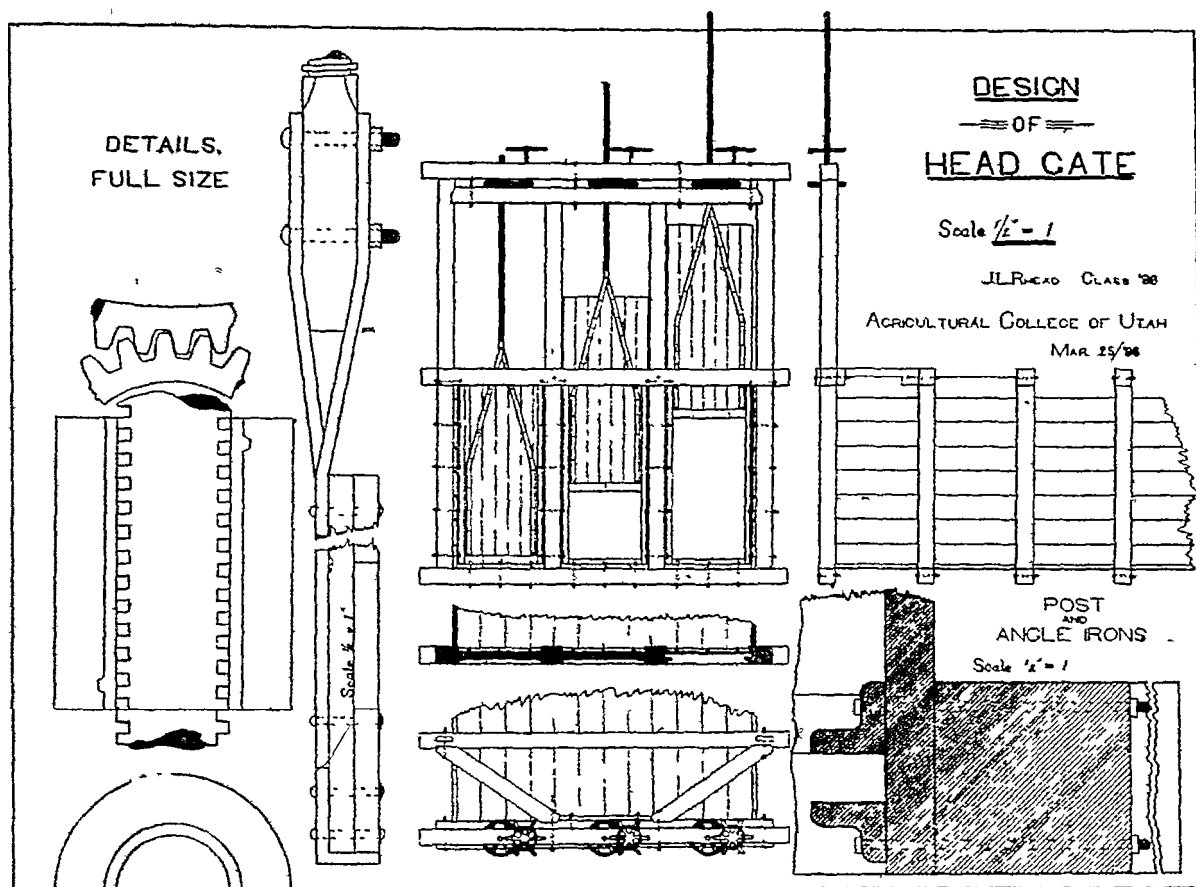


Liriodia boubosa

all mag 700 diam.

A. N. Merrill.

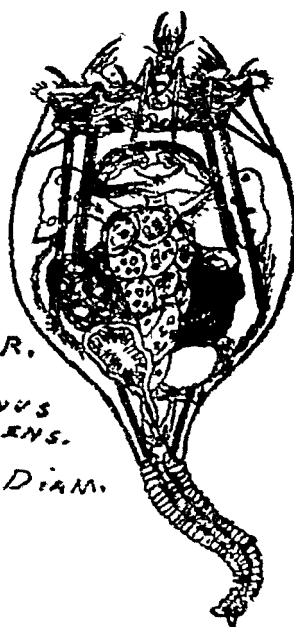
CLASS WORK OF STUDENTS.—CIVIL ENGINEERING.



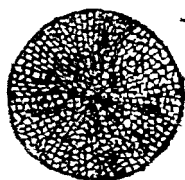
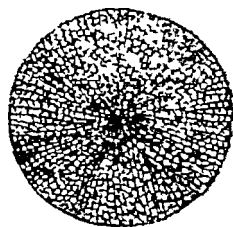
CLASS WORK OF STUDENTS—BIOLOGY.
GENERAL BIOLOGY



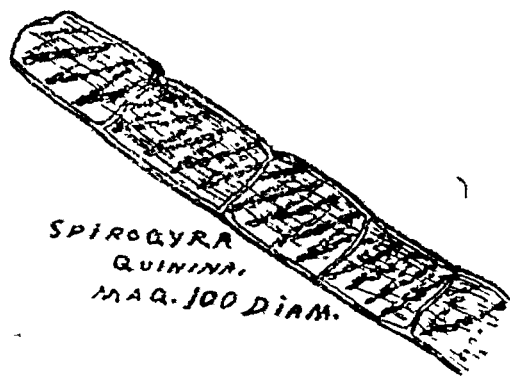
TARDIGRADA.
MAG. 160 DIAM.
OR
LITTLE WATER BEAR.



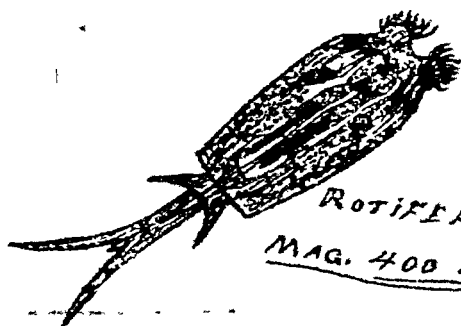
ROTIFER.
BRACHIONUS
RUBENS.
MAG. 700 DIAM.



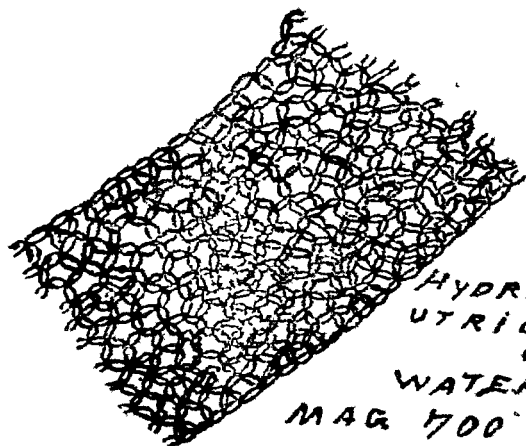
FOSSIL DIATOMS—
COSCINODISCS.
MAG. 600 DIAM.



SPIROGYRA
QUININA.
MAG. 100 DIAM.



ROTIFER
MAG. 400 DIAM.



HYDRODICTYON
UTRICULATUM.
OR
WATER NET.
MAG. 700 DIAM.



MOULD.
700
DIAM.

CHRISTIAN LARSEN